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Editorial

This month we include two papers from the Aslib conference on Evaluating the Intranet. Other papers will follow in subsequent issues. The two selected here contrast the approaches of a very large organization – Glaxo Wellcome – and a very much smaller one, which is an agency of the NHS Executive.

In the first case the problem was one of knitting together a large number of disparate technical strands at the highest possible level, to achieve optimum performance across large sections of a very large company. In the second case the problem was one of trying to show that much was achieved in the first phase (designed to 'sell' the system to management) while keeping the costs as low as possible. In effect the first paper asks whether anything was left out or forgotten: the second asks whether things really have to be included.

Despite these obvious differences both speakers were prepared to question whether the technology added meaning or value to the information being manipulated and displayed; or whether it was perhaps technology for its own sake.

At the recent International Online Meeting and Exhibition (December 3rd-5th) it was possible to get the impression that technology was the purpose of information handling, while the actual information was simply there to legitimize the expenditure. Everyone had an angle on the Internet and Intranets. Information was much discussed; although few exhibitors seemed prepared to recognize that information is only what is useful to a particular person at a particular time and in a particular way – it is not a seamless whole.

Depressingly, a number of the organizations that did recognize the individual basis of information provision and management viewed that aspect as something that could be addressed technically too. Perhaps only a handful of stands could offer a more sanguine view: that there have to be intelligent people in the chain as well.

Why should this be so difficult to comprehend? We happily accept that the purpose of a word processor is to capture text in an editable form. We do not expect the machine to compose the text as well. But when it comes to information storage and management, there is somehow an expectation that the machine can add meaning at the point of retrieval, even though it cannot do this at the point of creation.

By way of a contrast we also present a paper on the information needs of parents, as an example of a study of user needs. And to go right back to basics, a paper on the use of exhibitions to encourage library use and budget allocation in an environment where literacy rates are low, and reading has to be encouraged in all age groups. Yes, people have to be taught to want, and to use, information.

Peter Gillman
Editor

The information needs of parents

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Abstract

The information needs of consumers or the general public have been neglected by information researchers. Consumers are the users of public libraries, they are changing their sources of information and they are a very large group. This paper discusses two investigations into the information needs of parents – a sub-group of consumers particularly important to the future of libraries. In the first investigation carried out by the authors the records of a telephone helpline were analysed to find out the subjects of the information that parents needed. These were: children's behaviour, family problems and school. The second investigation, funded by the British Library, involves discussion groups and interviews with parents of children under 5 in the London Borough of Haringey. These parents need information with particular characteristics: it should have authority. Local information is helpful. Information may be needed very fast when a child is ill. 1990s parents want current information. The viewpoint may be important. Considering sources of information, oral information still comes first, books remain reliable and grey literature (e.g. newsletters) is considered very useful. Information provides support for parents undergoing a major transition in their lives.

Introduction

In the rush to investigate the information needs of people at work or study, the information needs of consumers or the general public have been wholly neglected by information researchers. As a result researching the consumer seems to have been abandoned to market researchers and researchers from other disciplines. It is almost as though this group was not worthy of investigation. One is reminded of the 1960s, when information researchers and funding bodies did not believe that anyone other than scientists merited investigation. There are reasons other than neglect for studying consumers. Firstly, what they need and do has a huge bearing on public libraries – an information community currently being buffeted by all kinds of political, economic and technological pressures. Secondly, with computers, CD-ROMs, modems etc. increasingly filtering into homes, there are, potentially anyway, huge changes about to take place in the way that consumers meet their information needs and set about information seeking. Thirdly, the sheer size and importance of this user community – the biggest of all, of course – demands that the information profession takes cognizance of their information needs. In fact the very size and heterogeneity of this group has put many researchers off studying this group. There are also some thorny methodological problems. Researchers have always liked studying the information needs of coherent, pin-down-able and compliant user groups. Hence the popularity of students in this role – an over-researched group if there ever was one. Getting hold of consumers and getting their co-operation is a very much more difficult problem.

The authors, supported by British Library Research and Innovation Centre funds, are taking some tentative steps into understanding the information needs of consumers, through a study of the information needs of an important sub-group – parents. This article discusses two investigations: an investigation of a telephone helpline for parents[1] and field interviewing of parents with children under five in Haringey – the latter project is still in progress.

A parent's helpline

The helpline was that provided by Exploring Parenthood, a charity that provides advice, education, information and counselling for parents. Their Parents' Advice Line is used by parents to discuss problems with a trained counsellor. Parents ring the office and make an appointment for a counsellor to ring them back at an agreed time. The call usually takes about half an hour. Both parent and counsellor are prepared with information on areas they want to discuss. Calls follow the pattern established for helplines[2]. This starts by establishing trust so that the caller feels received, heard and respected, then continues to explore the content and context of the call and the feelings of the caller. The caller is helped to identify his or her next step and the call is ended. Details of the callers, their partners, the children and the problems are recorded. The records from these calls were analysed by the authors to find out the information needs of parents.

An example of the type of query received was the call that came from Paula, who was divorced and living with a new partner. Paula's daughters aged 9 and 5 were 'clingy' and cried at night. Paula's ex-husband questioned the children about Paula's new partner when he visited. The counselling process explored the children's stress and unhappiness. Education was about encouraging the children to talk about their fears and making a safe and secure bedtime. The information provided was about sources of help for the children.

Children's behaviour generated the most calls. Parents rang about incidents like shouting matches, rudeness, sleeping difficulties, tantrums and violence. A typical example is the call from the mother of 4 year old Phil, who rang about his tantrums and subsequent asthma attacks. Phil's mother and grandmother were in conflict over dealing with this and his father decided to sit on the sideline. The advice provided included information about asthma and how to deal with tantrums. Counselling focussed on the conflict and who had authority.

Family problems also brought their share of calls. About a quarter of the parents were divorced and access and step families featured strongly. Bereavement often came to light during counselling. One caller wanted help with her 7 year old daughter, Tina, who was 'out of control'. Tina had spent a lot of time with her grandmother who had been placed in sheltered accommodation and then died. Tina did not attend the funeral. The counselling process focussed on Tina's feelings and ways to help her grieve and remember her grandmother. In this sad call the information provided was the title of a book, about how a child came to terms with her grandmother's death, which could be read to Tina.

Schools also merited concern. Exams, difficulties with teachers, truancy and bullying were all causing problems. Janice rang about her 2 year old daughter who was being bullied by a friend's child at nursery school. Discussion confirmed that it was a serious problem, and information about how schools are organized helped Janice to identify her next step, which was to talk to her daughter's key worker at the nursery.

The helpline study gave a picture of private and personal information needs. The need for immediate and processed information from a trusted person was a theme that ran through the information needs of these parents.

Field study of Haringey parents

In search of more comprehensive data on parents' information needs, parents of children under 5 in the London Borough of Haringey were interviewed. The parents were first contacted through the services they currently used – the library, nursery and clinic. Discussion groups were formed to generate ideas and ensure uninhibited discussion. The parents were very clear about needing information on child care and health, and suggested other subjects like money and education, training and careers advice for themselves. These topics were incorporated into interview schedules, and 30 parents were interviewed for about 20 minutes each. The data are currently in the process of analysis, but already the chief characteristics of the information that parents need are becoming clear.

Firstly, parents need authoritative information from respected sources. Parents turn to tried
trusted experts on child care. Penelope Leach's *B
and child*[3] was first published in 1977, and has
sold more than two million copies. Leach is a
chologist and her work bridges the gap betw
research and parents. Parents also need informa
about the locality in which they live. They can c
go so far with a toddler or a baby in a bu
Dangerous crossings, and crowded buses with
conductors, and high steps, pose real obstacle
travel. So when parents want child care informa
it has to be provided locally. Library notice bo
are very useful sources here, as are regularly
dated computer databases of local services. The sp
with which they obtain information is very impor
for parents. If parents are worried about a child v
suspected meningitis, they cannot wait for a surg
appointment, and a home visit or telephone call
GP or Health Visitor is needed. Helplines are v
important here in supplying this advice immedia
to parents in their own homes.

Parenting advice has changed over the deca
and new parents will want current information,
corporating the latest research. Parents looking
advice about a crying 3 month old baby have v
ously been told that he was exercising his lu
suffering from colic, windy, bored or lonely[4].
emphasis depended on the era in which it was gi
Grandparents will have obtained different advic
their day, and their advice may not be relied up
Many parents will also want information prese
from a viewpoint sympathetic to their beliefs. Th
wanting a sustainable future may want their life-s
to reflect this aim. Juliet Solomon supports 'gre
parents in their search for non-consuming child ca
Also, parenting advice is usually written for moth
Men may want a father's viewpoint. Martin Fra
gives fathers the medical information they need
the courage to hold, nurture and enjoy their o
babies[6].

In a culture which pays a lot of lip-service
electronic information, the care of the under-five
still an area where oral sources are preferred. Ex
opinions are sought and Health Visitors and
relied upon for health information. In most cases
the only information channel by which resea
reaches the parent. If there is a health scare, as
example about the safety of baby milk, the resea
scientist makes a rare appearance on national
news. Friends provide the other oral sources of in
mation. For this reason first-time parents have a g
need for friends with children the same age as t
own. Parents start to build a network of friendsh
with neighbours and with other parents they mee
'parents and toddler' or play groups. Informat
about local services, particularly child care and e
cation, is passed round this network of local frie

Books on baby care remain popular. Parents h
confidence in the advice from well-known auth
and the book is always available, on the shelf, in

emergency. Grey literature also comes into its own. A newsletter produced locally can support the network of friends, providing news about meetings and sales of second hand clothes and equipment. Leaflets from specialist organizations, for example, The Vegetarian Society, can help parents develop their own parenting.

Conclusion

Providing information for parents can contribute to the general support for parents that is recommended in *The Children Act* (1989)[7]. This support is all about the creation and enhancement, with and for families in need, of locally based (or accessible) activities, facilities and networks[8]. There are many ways to parent, and support should help parents to develop their own styles. The aim is for parents to be confident and competent[9]. Good parents have skills, understanding, and self-awareness and knowledge. Poor parenting (through poor advice and information) can actually be very harmful. Longitudinal studies show that children who experienced poor parenting were more likely to acquire a criminal record[10].

Parents are at a transitional stage in their lives when a need for information arises. Quite suddenly parents need to know about how to care for a baby, how a child develops and where to go for help. Later local services, particularly education, become important. There is also a period of transition within the family. Parents may be part of a family unit which differs from the one they were brought up in[11]. There are now more one parent families, more divorce and separation and more re-partnering and remarriage. Women who combine motherhood and employment have increased. Unemployment amongst men in their thirties, many of whom will be parents, has increased. Poverty among parents is also increasing. Information enables people to cope with change, and parents are a group with a particular and vital need for information.

Parents are key information users and players. They are the trustees of our future. Parents will probably bring children into the library for the first visit. Parents help the development of literacy, the essential skill for library use. The active involvement of parents in early childhood education brings great benefits to children[12]. The information needs of parents are pertinent to librarians. Ideas about parenting and parents' needs have changed. They receive less support from their own parents, and need more from friends and services. The views of parents should help to develop services in a direction that responds to users.

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Exhibitions in university libraries: the Nigerian experience

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Abstract

This paper presents a survey of research using a questionnaire to investigate the role of exhibitions in Nigerian university libraries.

The study revealed that exhibitions are not taken seriously as a means of attracting both potential users in a society with poor reading culture and more funds for library development. None of the responding university libraries had any written policy on exhibitions nor made budgetary provisions. Between 1991 and 1995, only 83 exhibitions were organized, an average of 16 per academic year. The occasions attracting exhibitions were major anniversaries such as convocation, national day, students' orientation and displays on subjects of general interest. About 50 per cent of the libraries hold exhibitions irregularly.

The problems associated with the effective management of library exhibitions were highlighted, while suggestions were proffered to make exhibitions meaningful in Nigerian university libraries.

Introduction

Exhibition has been succinctly described as "organized displays of works of art, science or industry for stimulating public interest, promoting manufacturers, expanding trade or illustrating the progress and accomplishments of one or a wide variety of productive activities"[1].

There are three kinds of library exhibitions: the literary type, the museum type and the commercial type. Literary type of exhibitions are frequently mounted by libraries with exhibits accompanied by scholarly annotations. The essence of commercial exhibition is to promote the sales of exhibits; while in the museum type exhibitions, objects are generally put on display accompanied with descriptive annotations.

Objectives of library exhibitions

Library exhibitions are often mounted to achieve the following objectives:

1. To create awareness about information sources and services in the library.
2. To create demand and use for information resources and services exhibited.
3. To create a positive attitude for the library as an important asset of the university in the pursuance of its objectives.
4. To communicate to the community the institution's efforts, including achievements.
5. To enhance the status of library personnel[2]. Lyle (1974)[3] identified four types of occasions that are marked with exhibitions in university libraries. These are:
   - (a) exhibitions on specific library services, such as abstracting *cum* indexing services and audio-visual materials;
   - (b) celebrations of particular 'weeks'. These types of exhibitions include those mounted by associations and groups to mark annual events and activities, usually lasting a week or more such as National Library Week;
   - (c) displays of particular subjects that are of general interest such as exhibitions on architecture and art;
   - (d) exhibitions featuring anniversaries associated with outstanding individuals or events, such as orientation for new students, convocations, matriculation, conferences, independence and occasions of national and international significance.

Recurring exhibitions usually encompass the history and traditions of the university, acknowledgement of important gifts and publications of faculty members.

Objective of this study

Although previous students[4-7] have articulated the role of exhibitions as publicity strategy in Nigerian university libraries, this study becomes necessary because the previous ones were limited to specific university libraries rather than encompassing all university libraries.

This study therefore seeks to answer the following questions:

UNIVERSITIES	YEAR ESTABLISHED	BOOK STOCK (VOLUME)	TYPE OF UNIVERSITY
1st Generation:			
ABU, Zaria	1962	433,401	Conventional-Federal
OAU, Ile-Ife	1962	281,885	"
Univ. of Ibadan	1948	560,000	"
Univ. of Lagos	1962	300,000	"
2nd Generation:			
Bayero Univ, Kano	1975	26,000	Conventional-Federal
Univ. of Benin	1975	226,917	"
Univ. of Calabar	1975	69,400	"
Univ. of Ilorin	1975	53,346	"
Univ. of Jos	1975	130,000	"
3rd Generation:			
Univ. of Abuja	1988	19,000	Conventional-Federal
ATBU, Bauchi	1981	41,000	Sci.&Tech.-Federal
Fed. Univ. of Tech., Akure	1981	40,000	"
Fed. Univ. of Tech., Owerri	1980	45,000	"
Fed. Univ. of Tech., Yola	1981	16,944	"
Fed. Univ. of Tech., Minna	1983	19,387	"
Fed. Univ. of Agric., Abeokuta	1988	25,413	Agric-Federal

Table 1: Profile of responding libraries

1. Are library exhibitions desirable?
2. For what purposes do libraries organize exhibitions?
3. How regularly do Nigerian university libraries organize exhibitions?
4. Do Nigerian university libraries have written exhibition policies?
5. What kinds of exhibitions do the libraries mount and how are they publicized?

Methodology

The study was limited to libraries in federally controlled Nigerian universities. Twenty-two libraries were chosen. A letter succinctly outlining the aims of the survey and a brief questionnaire was mailed to them.

Completed questionnaires came from 16 of the libraries, a response rate of 72 per cent.

Data analysis

General overview:

As shown in Table 1, the 16 responding university libraries comprise one university of agriculture with about 26,000 volumes of monographs, five universities of technology with library collections ranging between 19,000 and 45,000 volumes, and ten conventional universities with collection sizes of between 19,000 and 500,000.

Librarians, cognizant of the low level of library patronage as a result of poor reading culture, even at the tertiary level of the Nigerian educational system, mount exhibitions to increase the number of potential library users as well as motivate actual library users to stick to libraries for life-long education.

The desirability of library exhibitions in advertising collections is in conformity with Ranganathan's law (1964)[8] that highlights drawing attention to library resources for full exploitation by users.

Regularity of exhibitions

Though all the responding libraries (16) confirmed that it was desirable to mount exhibitions, when asked whether or not they held exhibitions, only ten (62 per cent) answered in the affirmative, while six (37 per cent) did not for any reason mount exhibitions. As presented in Table 2, between 1991 and 1995, a total of 83 exhibitions were mounted, an average of 16 per year. This revelation portends doom to the survival of academic librarianship in Nigeria, if university libraries cannot use exhibitions to draw the attention of policy-makers to their importance as agents of change and development.

The upsurge of exhibitions between 1993 and 1995 was due to continuous display of books and journals received by most federally-controlled universities under the auspices of the World Bank Loan to promote optimal use of the stock. The loan was taken by the Federal Government of Nigeria to redress the book famine plaguing the university sector of the Nigerian educational system since the mid-1980s.

No wonder the library profession is facing Herculean and daunting tasks in making the government

YEAR	NO. OF EXHIBITIONS	RELATIVE FREQUENCY (%)
1991	10	12.05
1992	8	9.64
1993	18	21.68
1994	21	25.30
1995	26	31.33
TOTAL	83	100.00

Table 2: Exhibitions in Nigerian university libraries, 1991-1995

see the need for the formulation of national library and information policy, as well as inaugurate the Librarians' Registration Council of Nigeria, a year after endorsing the National Registration Council for Librarians' decree.

As shown in Table 3, of the 16 responding libraries, nine (56 per cent) hold exhibitions irregularly (that is, when the need arises, once in a while, when desirable or when necessary), while five (31 per cent) and two (6 per cent) respectively hold exhibitions annually and quarterly. As centres of excellence for learning and research that attract various kinds of people in pursuit of knowledge from within and outside the university, it behoves university libraries in Nigeria to mount exhibitions on a regular basis.

REGULARITY OF EXHIBITIONS	NUMBER	RELATIVE FREQUENCY (%)
Irregularly	9	56.25
Annually	5	31.25
Quarterly	2	12.50
TOTAL	16	100.00

Table 3: Frequency of exhibitions

Exhibition policy

None of the 20 sample libraries had any written policy on exhibition. This accounts for why exhibitions are organized irregularly. This means that the role of exhibitions as publicity strategy is not taken seriously in Nigerian university libraries.

For effective exhibitions, libraries should fashion policy guidelines as well as have standing exhibition committees to plan ahead of time. Only one library in a university of technology has a standing exhibitions committee. Some of the roles of an exhibition committee are to advertise and annotate exhibits mounted as well as review the success or failure of exhibitions with a view to making improvement.

Types of exhibitions

As revealed in Table 4, the dominant type of exhibition was the literary type (56 per cent) meant for the promotion of library services, followed by the commercial type (25 per cent) for the exhibition of art works and books by book sellers and publishers, while museum type (18 per cent) trailed last.

In about one third of the university libraries, exhibitions were mounted to publicize subjects of particular interest, while anniversaries, such as convocations, orientation of students and National Day accounted also for 29 per cent of occasions marked. Surprisingly, the promotion of library services accounted for just about 18 per cent of occasions marked with exhibitions, as opposed to the 56 per cent recorded under exhibition distribution by type in Table 4. It is pertinent to state that even during anniversary events, libraries promote their services.

TYPE	NUMBER	RELATIVE FREQUENCY (%)
Promotion of library service	9	56.25
Commercial type	4	25.00
Museum type	3	18.75
TOTAL	16	100.00

Table 4: Distribution of exhibitions by type

Occasions marked with exhibitions

Table 5 presents the occasions marked with exhibitions in the responding libraries.

OCCASION	NUMBER	RELATIVE FREQUENCY (%)
Anniversaries (convocation, National Day, Students' Orientation, etc.)	5	29.41
Celebration of particular 'week'	3	17.65
Displays on subjects of general interest	6	35.29
Library services	3	17.65
TOTAL	17	100.00

Table 5: Distribution of occasions of exhibitions

Publicity of exhibitions

In response to how the exhibitions are publicized by the few libraries that exhibit, the predominant medium is library bulletins (35 per cent), followed closely by the use of Library Annual Reports (23 per cent), while Library Guide and Readers' Handbook each accounted for 17 per cent. The predominance of library publications for advertisement of exhibitions may limit the benefit of library exhibitions to only librarians, thus defeating the advantage of winning more users to our stock in trade, books. The more conventional sources, such as print and electronic media, should be used to attract the community at large to library exhibitions.

Problems

A number of problems are associated with the effective management of library exhibitions. Some of these problems listed by respondents are:

1. Non-appreciation of the need for exhibitions by libraries.
2. Lack of materials for exhibition.
3. Noise and crowd control.
4. Problems of planning.
5. Space problem.
6. Lack of a formal policy statement by university librarians who only dictate when to have exhibitions.

Discussion

An exhibition is one of the means of getting the public to know and appreciate the contributions of different academic programmes to the advancement of social, economic and scientific development. In addition, libraries also weave their own exhibitions with anniversary events in order to publicize their collections and services. However, Nigerian university libraries should increase the number, scope and depth of exhibitions for the promotion of their services.

The study showed glaringly that exhibitions are not taken seriously by libraries as a potent means of attracting more funds for library development.

Conclusion and recommendations

Exhibitions no doubt can be used by libraries to good advantage, particularly as publicity strategies.

Nigerian university libraries should therefore take advantage of using exhibitions as potent public relations strategy. To redress the dismal performance of libraries in the area of exhibition, the following recommendations are prescribed:

1. Libraries should prepare comprehensive exhibition guidelines for the use of exhibitors. The need for well thought out exhibition techniques needs to be clearly spelt out.
2. It is necessary to have trained exhibits librarians to occupy official positions in our university libraries. An exhibit librarian must be an artist with the creative ability to construct exhibitions with logical plans. As a specialist in library work, when he or she performs his or her task faithfully, he or she has a talent for creating timely interest in the resources around him or her.
3. Nigerian library schools should fashion curricula for the training of exhibits librarians.
4. Libraries should publicize their collections by linking exhibitions to their collections and services. Major book donations should be exhibited to promote use and spur others to emulate such gestures by making donations too.
5. Demand for library collections can be created through exhibitions. It therefore behoves Nigerian university libraries to increase the number of potential patrons to their libraries by mounting exhibitions at regular intervals in the year. Library patronage can be increased and sustained in Nigeria, where reading culture is low, through articulate exhibition programmes.
6. Equipment and materials needed for mounting exhibitions should be procured, such as exhibit cases, display boards, table sheets (cloth), poster paints, cardboard, book ribbons, etc.
7. A good exhibition is a pleasure to make and when it generates interest there is satisfaction, but even the best exhibition loses its attraction if kept too long. Therefore, the wise exhibits librarian should remove his exhibit at the right time and have another one ready to replace it as soon as possible, knowing that exhibition is infinite in scope and continuous in practice.
8. Nigerian academic libraries are advised to operate separate budgets for exhibitions to make them regular features in our libraries.
9. Finally, the duo of the Academic and Research Library Section of the Nigerian Library Association and the Committee of University Librarians of Nigerian Universities (CULNU), should formulate a guideline on library exhibitions.

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The Intranet – the quiet (r)evolution

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Paper presented at the Aslib conference on Evaluating the Intranet as part of your knowledge management strategy, 26th and 27th September 1996.

Looking at computing and networks

Costs

At a meeting of The Royal Society of Arts, an IBM researcher made the following statement: "The only fact that matters is that hardware costs fall by 30% per annum in real terms." Pressed later on he added the following: "Network costs fall by 50% per annum." These two statements should not be dismissed lightly. At a lecture to a British Computer Society (BCS) group, it was also stated that in 1989 a 50 MIP system cost about £250,000 – £5,000 per MIP. Today that cost is £2,500 – £50 per MIP: a hundred-fold reduction.

Where did the Intranet come from?

Beginnings in the ARPANET

The ARPANET was designed to provide Command, Control and Communications (C^3). The network control was distributed, so in the event of a nuclear attack, the network was fault-tolerant and would continue working. The ARPANET slowly transformed into the Internet as more and more academic sites became part of it and as the need grew to transfer information between centres.

Ethernet the universal network medium

Ethernet has become the de facto standard for LAN networks. Other forms using token-ring are used, together with the growing use of fibre, and faster forms of Ethernet.

TCP/IP the standard – the failure of ISO/OSI

TCP/IP is now available for most platforms. The fact that this protocol is used is because it was used in the ARPANET. In the 1980s the ISO was claimed to be the "way forward" and governments in Europe pushed hard to make the OSI protocols the ones used. However the failure to produce a reasonable protocol, especially for the directory services, moved off into X.500, and gave the lie to the major problems of producing the full OSI 7 layer protocol stack. User buy-in required users to buy; manufacturers did not produce hardware supporting the protocol stacks, except when it was a government contract and the result was that in the end ISO had to add TCP/IP to the model. Apart from X.400 and X.25/X.75, little use is made of it on the networking model.

WAN – fibre everywhere

The POTS service has been massively upgraded to have a large quantity of fibre, giving greatly increased bandwidth and improved connectivity.

The World Wide Web revolution

Not since the days of Clive Sinclair and the ZX Spectrum has there been such a change in computing. The World Wide Web invented (created?) to help scientists share data at CERN, has been transformed by The National Center for Supercomputing Applica-tions with their NCSA Mosaic and httpd Web server.

The change in who provides information

Because of the ease in publishing basic information on the Web, the actual mix of people who provide information has changed. It encompasses a much broader range, from departments to individuals. The days where IT departments controlled access and projects to produce information from databases are effectively over. IT will still provide knowledge and resources, but the end users of information are now often the providers as well as consumers of information.

No talk about the Web should exclude a mention of Ted Nelson and Xanadu. The ideas he expressed never quite made it in life as he envisaged, partly because two-way pointers would mean that the system would not be so fault-tolerant. However he can be given credit for many of the ideas we now see in the Web. For more information see the URL http://jefferson.vllage.virginia.edu/elab/hfl0155.html

One thing is that, of course, the Web was developed by a whole lot of people across the Internet, who discovered about it on Internet User Groups and went away with the ideas and started playing and encouraging each other, and developing a little grass-roots community. The Web owes an incredible amount to those across the Internet, and also to the 'bosses who didn't say no' who are now all wearing halos across the planet, and who really enabled this sort of thing to grow to the point where they didn't have the option of saying no.

The other thing I would say is that the ideas existed before putting it together in the World Wide Web, which is basically trivial.

Netscape – the vision

Bill Gates may have produced DOS, *Windows* and the 640K memory barrier, but the vision in Jim Clark of Netscape collecting all the current browser and server writers from NCSA and CERN was a master stroke. This has meant that Netscape Navigator version 3 was the fourth browser some of the team had written. The marketing method of free evaluation and easy online access to the software resulted in a very large market share. Things are changing now with the introduction of Microsoft into the Internet ring, but despite Microsoft's massive software base on the PC platform, it will still be a while before they can be ahead on market share over Netscape in the browser market. As yet only Netscape can offer the UNIX platform for server and browser and the Net community is certainly not embracing Microsoft as the only solution. Users in fact have much to gain over genuine competition between browser vendors and in the long run running an open network and software policy to continue to provide a faster progress through possible ideas and solutions to problems.

The Web enables the Intranet

Having the open multi-platform Web has provided the ideal means of linking the different information sources of a company. Just being able to connect to any system is only part of what the Intranet can offer. The Web provides the seamless method of interaction and in many cases removes the need for most users to need to login to multiple systems. This was often a complaint in the past, with users asking why they had to work on a number of different systems and why could the software they wanted not all be on one? The Web-aware software is now allowing users to work on their own desktops, while accessing any system they need without continually logging in and out.

Why do we need the Intranet?

In the modern world, pressure is on companies to become more efficient. Downsizing is commonplace, yet each of us needs to collect more information, process this quicker and compete. In world markets, this pressure is even greater. In addition regulatory requirements become more complex and change constantly. Books just become quickly out of date in some areas.

Staff are expected to take this all in their stride. The computer on their desks can access much of this information, but often each source requires a special access or different hardware and software, making the learning curve even steeper for the newcomer.

Since staff have computers, there is a need to make these all work together. In the recent past a merger of two building societies was called off when the costs of getting their computer systems to work together was found to be considerably higher than forecast. Even with smaller systems, the differences between IBM mainframe working and VAX or UNIX or PC systems can make simple things very much more difficult.

Uses and advantages of an Intranet

As opposed to having multiple computers and/or terminals on a desk to access different hosts, the PC or workstation can now reach any system. For the technical staff this helps greatly in support and maintenance. My own desk UNIX workstation allows me to work on any of our UNIX, VAX or Prime machines and this access is over a common network, so if required, large amounts of data can be moved between machines. In the UNIX environment Glaxo Wellcome in Research has implemented a common user home directory system over most workstations using an NFS server. This means I can actually use any UNIX system and still have my own files and personal desktop.

Many departments are now providing much more information online on the Web. Reports, projects, team information are being made available, and this allows others to share and be involved in the work. It has resulted in the discovery of staff outside the normal IT organization who have been able to make good contributions to this process. No IT department could provide and maintain all the information, so the real providers have to do this, but as a result they feel that they own their work and tend to keep it more current than when they were not responsible for updating it.

Text, graphics, movies, sound

The breakaway from plain text into graphics, movies and sound means that more interesting ways of presenting information are possible. Newsletters can look like pages of a newspaper where this is helpful. The common problem in all organizations is getting people to read information they need to. The Web provides another vehicle to do this, with the added advantage that older information can be searchable and recoverable. The paper copy of the in-house magazine is thrown away, but the electronic one can be referenced again by other documents. Security and other company policies can be online and referred to by links. When updated, the links refer to the current copy and not last year's one.

The Web provides a means of small projects being set up. Even single users can produce high quality information and make it available quickly to all. Contrast this with the old approach, which often meant the system did not appear for months, and by then the needs had changed. Groups of user can experiment with solutions – the best ones get adopted, while the others are let go, but the experience in why one failed and another succeeded can be built upon.

Yet again the ability of a user to create a useful resource with her or his own desktop and to access this and everyone else's information provides a great efficiency improvement. Also since a wide range of platforms support Web access from TTY sessions using Lynx, all manner of PCs and up to large graphics workstations, the actual equipment on a user's desk should not prevent access to the information. There are obvious areas where new graphic based pages, or Java applets may disenfranchise some users, but careful thought when providing general information to all can mean this is not a problem. After all a rotatable protein structure is of interest to the research scientist and not to the electrician or engineer, except maybe in passing.

Serving information allows what was often private information accessible by only the few now to be public information served to the many. There is no reason why if you have an Access database, you cannot serve it direct from the PC. An example could be information in a department about future holiday dates for staff. If kept on a local PC, all queries about holidays used and dates have to go through the secretary. If served on the Web, anyone who needs could see the information. It would not matter if the server only was available 9 to 5, when the secretary was, because the users could enquire and plan and then get the secretary to update the information. Web servers can serve any number of pages to any number of users, and small servers dedicated to a single simple task are quite feasible.

Can we believe the hype?

Reading the press, you might think that the Web and the Intranet are the holy grail of computing. As we all know fashions change and this will mean that there will be something different soon. However although the Web does not mean your company will be transformed overnight from ugly ducking to beautiful swan and the Intranet will make all those communications problems vanish, I think we will never turn back from the changes we are seeing. The combination of increased CPU power, cheaper storage, fibre and fast networks, TCP/IP and Web servers and browsers has changed the direction of computing and made it more accessible and like a tool and not just something used by a few. The large number of Internet Providers, providing network services and Webspace have moved computing of this sort to the consumer and when the consumer is also the managing director, the IT department had better respond to the business needs!

If you read all the magazines, and follow the conferences, you might think the Internet is all about making money *via* the Web. Many pages now have adverts and sponsors. A page from the US with an advert for some PC hardware supplier is hardly likely to have much impact here in the UK, or France, Australia or Japan. In some areas it will work, but to be honest, I tend to ignore them. Companies however can promote their image with well-presented Web sites. Blowing Glaxo Wellcome's trumpet, I can say we have won several awards for our external site http://www.glaxowellcome.co.uk/

However it is the Intranet sites that can actually help a company to improve internal communications and raise efficiency and staff morale and corporate feeling.

The main advantage of the Web and the Intranet together is that a single user interface is possible. With Netscape Navigator, users on multiple platforms can view Web pages, read and send e-mail and news. Hyperlinks in news, e-mail and Web pages can point to each other, thus making it easy to comment in news or e-mail about a document, which is available online, as and when required. This interface to ftp, gopher, news, and other Internet protocols via the same software, almost completely eliminates the computer 'geek' factor required by the older systems. Present most users with a command line ftp interface, and they will be lost. However a URL starting with ftp:// will be to them just the same as one starting http:// and anyway the text in the hyperlink may well hide even this.

However we have noted users are not good at transferring operations from one piece of software to another. Even if a Web browser works much the same way as the Windows Program Manager or Word in terms of menus, cut and paste, etc., users do find it harder that expected. An example is the number of Netscape screen shots, which still have the button bar, the location bar and the full pictures/text tool bar turned on. Changing the tool bar to icons or text and turning off the button bar (the items are in the menu pulldown anyway) provides useful extra screen area for information. However you can see for yourselves just how few actually use the configurations options, and I think the question of why needs to be addressed.

Glaxo Wellcome's Intranet

Infrastructure

As a company with world wide interests, I can only really talk about the R&D side, and this is biased to the UK. In this country, we have three main sites, Greenford, Stevenage and Ware. The main data centre is at Stevenage, and a secondary centre at Ware. The sites are linked by BT Megastream circuits in a triangle. Each site has a local Ethernet LAN, linked with routers. Stevenage, the newest site, has fibre-optic rings round the campus connecting the different buildings, and also smaller rings within the data centre.

Glaxo Wellcome's early days.

In 1979, Glaxo Research brought its first Prime 400 computer, with ¼ Mbyte of memory and two 300Mbyte removable disks, and 48 terminal ports. By 1986, we had nine Primes, two very large port selectors, an X.25 network, and two more Primes in the US and one in Italy.

In 1987 we started a switch to VAX, and in the mid 1990s, had a hundred of them of all sizes.

When the PC appeared in reasonable numbers, we started to get those to replace dumb terminals.

Today

The company now has about 3,000 PCs, 200 UNIX workstations, 100 VAXes of every size, 6 Primes, a Data General and more. Two 18CPU Challenge servers handle large bioinformatics jobs, while 3 Sequent UNIX servers handle HR and library systems. Other Hewlett-Packard machines run laboratory management systems (LIMS), and other Sun and Silicon Graphics servers support the Web and other systems.

Without TCP/IP the networking and access to all these would be almost impossible. The problems of Pathworks via DECNET and TCP/IP stacks on the same PCs is sometimes a major headache. DECs LAT protocol which cannot be routed also caused problems, because of the need for intersite bridges. The spanningtree wars round the three site triangle made for unproductive times in the past.

Software

The change over the past 12 months has been that the Web has finally been accepted as the way that information will be exchanged. As a long term aim we are replacing VAXNotes with our own internal Usenet newsgroups. We have about 100 now, some more active than others, but the advantage of Web access to news is considerable over the need to login to the right VAX to access VAXNotes. We are in the process of replacing VTX by a Web-based set of pages. Again the reduction in licensing costs, the greater flexibility of access and browsing, scores heavily in favour of the Web. An in-house paper based magazine has also been replaced by an electronic Web-based one. There was a VTX electronic part to augment the paper one, but the new one replaces both.

The second area of change is the online provision of the UK company telephone directory on the Web. The merger of Glaxo and Wellcome resulted in massive changes to people and numbers and attempts to keep a paper based copy up to date would have been fruitless. One is still produced, but most people with access use the online one. Users can request updates to their entry, which get processed in days rather than months. As yet on-the-fly updates are not possible for security reasons, but those limitations will be removed. Because of a company policy of unique login ids and non-reuse of these, we have a good key for linking users to their HR information, telephone numbers, Web home pages and e-mail. The completion of this ideal is harder, because some systems allow such short (7 character) user ids, but the process of making links between these systems is under way.

Scientists and support

However it is not just the share price or canteen menus that make the GWWeb and Intranet so useful. Two very different examples will hopefully provide pointers to what can be done.

The first is the major use by the chemists and biologists. Molecular modelling and genetic sequencing are very visual tasks and the Web with emphasis on the graphical side provides very good means to access to data. Tools such as RASMOL are used for molecular display and Java based tools for sequence display are being developed in house and elsewhere. The Web is used to allow users to submit jobs to the large Challenge servers and results are returned to them as summaries and hyperlinks to the full sequence data.

A simple search form has allowed us to supply interal laboratory manuals online that are seachable. Users thus have safety information online and up to date. It encourages further use of the Web, and obviously if other documents are written, which refer to this information, hyperlinks can be included directly to this.

We are also working on Web based search tools to provide ways of sequence alerting and thus prevent opportunities being wasted or work duplicated. Because pages can be linked to pages anywhere, information can be shared not only across UK sites, but between the UK and US, thus enlarging the research base without some of the problems of communication that this would normally result in. Transnational teams are thus possible with the Web providing the links between them. To my own mind, there is much more we could do with more bandwidth. Ideas like shared whiteboards, movies, even live video could allow better collaboration between researchers on different sides of the Atlantic.

What can we expect next?

Java

This is where the hype is. For some *Java,* from Sun Microsystems, is the ultimate tool. However its use does require good programming skills, as you have to do much of the hard work yourself. Smart developers tool boxes are appearing, but writing good applets is not as simple as it is sometimes made out to be. However *Java* is a object based language, which has not got most of the major failings of C++, which does help the robustness of the code and its security.

Java's main advantage is that it is basically platform independent, which for Web applets ensures that the openness of the Web continues. Even the *Windows 3.1* 16-bit market is now I believe catered for by IBM, who have produced a version of *Java. Windows 95*/NT/UNIX are all available and this means that in Web pages features not available in the browser can be handled, such as online updating of information, live data feeds, and more. Security with applets is an issue, with problems such as denial of service attacks by applets. However in Intranets, this should not be a problem, and if it is perhaps a review of staff conditions of employment is required.

Javascript
Javascript, not to be confused with *Java*, provides a scripting language in Web pages. Simpler to use than *Java*, it can provide that extra dimension to pages, making them more interactive and interesting. It is only supported in the Netscape browser, but other companies have agreed to license it.

ActiveX
OLE (object linking and embedding) by any other name. The currently hyped answer to all problems. Microsoft says it will be open, but a recent meeting about this was cancelled. The risks of the *Word* macro virus and the like rise as more 'documents' are executed by the browser on the user's behalf.

Real Audio
FM quality sound over 28.8Kbaud links. Audio in the past has been poor quality mono at 64Kbps (8Kbytes). Real Audio provides the improvement needed as well as having special servers to limit the network utilisation. We can expect more progress here.

Movies and live TV
Here we can expect more improvements as MPEG2 codecs become commonplace. Why have expensive video conference suites, when local cameras can serve to the Web and a virtual conference can easily be set up. If staff need to meet, why drive several people thirty miles each way, when many times you can meet over the net for half an hour. This will save time and cause less pollution. Already labs are communicating by providing movies of some experiments and models, so a second team elsewhere can see what happened, and this improves collaboration.

3D and VRML
3D Web pages are now possible with the VRML plug-ins available. Embedded hyperlinks allow navigation in 3D and 2D text and easy transfer from one to the other. Silicon Graphics have been leaders here, producing version 1 (VRML) and 2 (Moving Worlds), based on the Open Inventor file format. This choice provides easy transfer of existing CAD/CAM models from Inventor format to VRML. The site to see VRML in action is probably http://virtual-business.labs.bt.com/vrml/portal/home/ and the general research work on http://www.labs.bt.com/. There are other sites with chemical models and the like, showing where for scientific companies the future will lie.

AppFoundry
The latest offering from Netscape, designed to target the Microsoft Backoffice suite. The code is *Java* based, and thus integrates with Netscape's *Navigator* browser and usable over multiple platforms.

Lotus Notes
A major push to integrate *Notes* and the Web, making this a very powerful groupware application and building on an existing user base. One great advantage of *Notes* and WWW integration is the easy way the Web browser can display *Notes* data.

Improved publishing tools
Web authoring tools are becoming many and varied. Some, notably SoftQuad's *HoTMetaL*, are multi-platform and very sophisticated, while others like Microsoft's *Internet Assistant* are PC only and somewhat limited. Newer tools provide very complete authoring packages, such as *Cosmo Create* from Silicon Graphics for Unix systems, allowing easy addition of forms, tables, images and *Java* applets. This area will continue to expand, giving the range between WYSIWYG tools and those that make the HTML code more visible. You have to choose the tool to suit the users.

An area rather neglected is the create, test, authorize and publish cycle. For small projects where limited numbers of people actually create and maintain a set of pages on a server, this is not major problem. However for large page sets with in-house styles, multiple authors and a need to ensure only authorized changes are made, there is a lack as far as I know of software to manage the test and production Web servers and control the access and publish pages.

It is worth mentioning *Frontpage* from Microsoft here. This provides a Web front to allow online editing of pages on a Web server. This at first might seem the ideal answer, but to do this requires several large CGI scripts to be added to the server, and doing this means that unless the use of these scripts can be completely controlled, and the scripts themselves are correctly written, it is very probable that the security of the Web server and the actual system itself are compromised. For more information about this and the risks of using *Frontpage*, see http://www.mr.net/~fritchie/frontpage.html and http://www.microsoft.com/frontpage/.

What are the issues?
Bandwidth
The massive uptake of the Web on the Internet is causing congestion at times. However unless your Intranet has very limited bandwidth, access and page load times should be quite acceptable. Only where high traffic volumes and low bandwidth (<64Kbps) are available, will this be a problem. However good page design will use the methods of small image files with low numbers of colours on major pages, together with text-only page options. The massive graphic images do not by themselves produce good pages.

Structure
New users complain about lack of structure. Thought needs to be given to how each main area/topic on a

Web server is laid out. The freedom to do anything must be balanced against a too rigid structure. The former confuses, and the latter is often too sterile and equally results in users not returning.

Searching

In my view, Digital Equipment Corporation (DEC) have produced the outstanding Web Search Engine in Alta Vista. The idea of selling this product may well help DEC recover from some of its many problems. The system of machines is awesome, one with 6Gbytes of memory and 10 CPUs.

The ability to search for topics of interest over all files served by one or more Web servers is a basic requirement, unless the number of files is fairly small and/or the file hierarchy is well structured and the files already indexed in some manner. However the nature of the Web helps here, because any system that can produce searchable indexes, in a form which can be directly or indirectly accessed via a Web server is suitable.

The problem becomes harder once you have a range of Web servers on different platforms, because the same method to search all servers becomes much harder to use. This problem is solved by dedicated search engines, such as Harvest from the University of Colorado, or commercial offerings, like Excite, or Alta Vista. These work by using the Web crawler or spider to traverse the tree on each Web server, following the links it finds. This can cause major loading of a Web server, and so the idea of hierarchical indexes used by Harvest may prove the best in the long run. After all we have lots of different telephone directories, because of the task of keeping them up to date. Directory enquiries acts as a directory of directories.

Security

This is an issue, particularly when we start to get involved with patents, prior disclosure and other items where the law is different in other countries a company works in. The method of authorization using .htaccess, .htpasswd and .htgroup files to validate users is not perfect, because there are problems keeping this in step with other passwords. Glaxo Wellcome has solved its problems here, helped by the fact we are moving towards a common id system.

However possible concerns are in the area of local cached documents on PCs. Because an authorized user may cache (unknowingly) a document on a PC, an unauthorized user can read the document with a Web browser (try Netscape URL about:cache) or just use direct editing on the cached files. The PC is a totally insecure system because any user can start it up and read any file. There are ways of partly improving this, but in comparison with most multi user systems, the PC is a risk, because its local disk cannot be secured.

Legal

The comments above need to be considered in the light of patents and other similar issues. In the pharmaceutical world, different countries have different codes of what may be done in terms of regulation and advertising. On a global Intranet, you need to realize that any company employee may access your information. They may then use this information in ways that are not appropriate. Some attention is required here. What restrictions might be placed on personal information stored in one country, but used in an other? I leave this question unanswered, as it is not for a non-lawyer to deal with, but it is important to know that there may be issues.

Anyone wishing to read more about what the vision of computing may be and the direction it is heading would do very well to read the forthcoming book from George Gilder called *Telecosm*. Chapters are available online at http://www.discovery.org/ggindex.html

Bygone days

Peter Cochrane of BT (http://www,bt.labs.com/people/cochrap/index.htm) wrote recently that in 12 years the computer on the desk has changed as follows:

Component	**1984**	**1996**
Memory	1Mb	64Mb
Disk size	20Mb	2.5Gb
Clock speed	6MHz	166Mhz
Software memory	0.5Mb	20Mb

The word processor is now more sluggish.

It is important that effort is made to return to smaller faster applications, which can be combined as required, otherwise despite all the improvements, we will manage less work for more processing power.

The Web year

Finally a little quote to take away. "How long is the Web year?" At present this seems to be about 90 days – long enough for the next upgrade to be outside the normal warranty period, but short enough to get four product cycles in one normal year. If you do not think that is true, I suggest you take the next few computer magazines you get and save them for three months and then do the comparisons. Fortunately hardware years are still about 18 months, but who sells 486 machines now or 60MHz Pentiums?

Conclusion

In conclusion I hope this very personal view of the Web and the Intranet with much reference to what has happened and is happening in my part of Glaxo Wellcome will encourage others to see the value of an Intranet and the Web. If you do join this bandwagon, expect to find it an exciting ride, but also one which does have a positive payoff. Your competition will be on the road ahead of you, if you wait until things get less hectic.

User buy-in is vital. Without users wanting to use the Web/Intranet, you can waste time and effort. However if employees can see the benefit to themselves in their daily work, they will use it. Your IT department may not like the freedom it brings to users, but when they can go out and search and surf the Internet from home for less than £20 a month, they will expect it. In this case the story of King Canute comes to mind. Remember he knew he could not command the sea; it was his courtiers who thought he could.

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The inclusive Intranet: linking into legacy systems

Bob Bater
InfoPlex Associates, 18 Christmas Street, Bristol BS1 5BT

Paper presented at the Aslib conference on Evaluating the Intranet as part of your knowledge management strategy, 26th and 27th September 1996.

Abstract
No less than any other means of communicating and presenting information, an Intranet must be geared to organizational objectives through proper information management procedures. For smaller organizations, an Intranet need not comprise all of the standard components, and can utilize complementary technologies to incorporate legacy documentation systems at minimal cost and effort. The importance of gaining management commitment should not be underestimated, and an evolutionary approach can be the key to success.

A sense of perspective

I'm going to talk for a while this morning about what a relatively small organization is doing in the Intranet field – and a public sector organization at that. But I'm not going to talk solely about the Intranet itself – still less, I hope, about the underlying technology. What I do want to do, is to cut through the hyperbole and hysteria and present a down-to-earth example of how one small organization is using the tools actually available *now*, to build an affordable Intranet pulling together a variety of existing and new information resources into a coherent whole.

The software industry does seem to have a problem in presenting its innovations with a sense of perspective. I came across a paper a while back entitled "The Netscape Intranet Vision and Product Roadmap". It's downloadable from Netscape's Web site, and it makes very interesting reading. It focuses on the concept of a 'Full Service Intranet', a term derived from a Forrester Research report published back in March. The Full Service Intranet is going to provide access to all the applications and services we now enjoy on our PCs and mainframes – and more. It will be all things to all men – and women.

I've been scanning through a number of the fliers I've received recently for Intranet events. A similar sort of inflated phraseology seems to apply here too:

- Unleashing the power of corporate information
- Catalysts for profitable organisational redesign
- Transforming enterprise information management.

These are all pretty high-powered claims for what Intranets can do. I've no doubt that for some, it *will* be a matter of 'unleashing power' or 'catalyzing organizational redesign'; but can I really go to my Managing Director with phrases like that and expect to gain a champion?

Don't get me wrong. I'm not really knocking all of this, after all, it's what we've come to expect from the industry, with data warehouses, with groupware and with client-server before that. I believe Intranets have tremendous potential, but I also believe that the potential they have is definable only in terms of the individual organization, in terms of how that potential can support its business objectives. Not *all things to all people*, but *different things to different people.*

So which, if any, of these apply in the present case?

- Unleashing the power... no, it's not a breakpoint that's going to steamroller the competition overnight
- Catalyst... no, organizational redesign is not the aim
- Transforming... well, yes. I think this one's got it just about right.

The promise of this Intranet is the promise of *effective information management*, and the considerable benefits that flow from that. In your organization, it might be different.

The organization

The Institute of Health and Care Development – IHCD – is an agency of the NHS Executive whose business revolves around the training of NHS staff. As such, it:

- operates as an awarding body for health and care related vocational, professional and academic qualifications
- produces a guide to a wide range of training products and services appropriate to the NHS
- organizes conferences and exhibitions on the theme of training and development in the NHS
- publishes documents and training materials supporting strategic training initiatives emerging from the Department of Health
- administers a range of bursaries established to support specific areas of training
- undertakes research and consultancy in management and organizational development, in partnership with the Executive, individual NHS Trusts, and other NHS organizations.

It is a small organization, numbering about 65 permanent staff, plus an assortment of contractors,

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such as ourselves, providing specialist services. Although in the past the organization had several sites throughout the country, it is now concentrated at a single site in Bristol.

In terms of IT systems, the IHCD operates a LAN based on two *Windows NT* servers and one UNIX server, with workstations running Windows for Workgroups. Although upgrading to *Windows 95* on the workstations was considered last year, at that time the change offered little except the need to retrain all users in the new GUI. It was decided that we would wait for NT Workstation 4.0. That decision was a significant one as it turns out, because of course, much of the Internet/Intranet software now on the market is available only for 32-bit environments.

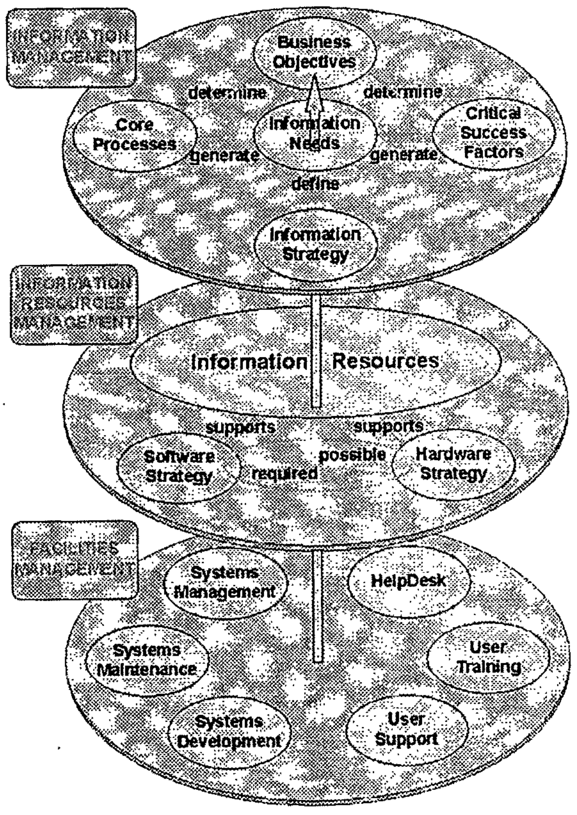
Strategy, audit and plan

So how does my organization fit into this picture? Well, we have a contract to provide IM&T – that's Information Management and Technology in NHS-speak – Services to the IHCD. We provide services on three levels:

- information management
- information resources management
- facilities management

The main output of our Information Management services is an Information Strategy for the Institute. This in turn generates Information Resources, Software and Hardware Strategies. The whole structure of IM and IRM is of course supported at the lowest level by the Facilities Management services we provide. (See figure 1.)

Figure 1.



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As part of the overall review process, we necessarily undertook a preliminary information audit. This allowed us to identify existing information resources – both electronic and paper-based – and to assess how well they served the purposes for which they were supposedly maintained. We had already identified the possibility of putting some or all of them on an Intranet in our Information Strategy. The main benefit of doing so was seen as improved internal information management, leading to better customer service.

Without going into unnecessary detail, we identified a number of areas requiring priority attention, and some where potential benefits could arise in the medium-to-longer term. A three-phase Action Plan was proposed:

Phase 1: Corporate documentation

We had discovered a wide range of 'corporate' documentation – mission statement, organization structure chart, personnel procedures – some of it more or less formally organized as loose-leaf 'Handbooks', and some of it issued as individual paper documents, as the need arose. It won't surprise you to know that many staff were unable to locate their copies of either the individual documents or the loose-leaf binders. A document misfiled is a document lost, as they say.

Even when able to find their copy of *Staff Guidance Notes* for example, even a cursory glance showed that most had not bothered to insert update sheets when received, and most of the individually-held copies were well out-of-date. I am sure this is a familiar picture for most of you. Suffice it to say that with this sort of evidence, the business case for an Intranet made itself.

In addition to the paper-based documentation, there were one or two online resources built in the Windows Help system – namely a library catalogue and associated thesaurus, and the Institute's Standing Financial Instructions – resulting from a previous attempt to put such information online.

Phase 1 – which is where we are now – was to concentrate on bringing this corporate documentation up to date and publishing it on an Intranet.

Phase 2: Operational intelligence

As well as uncovering the various existing information resources, our mini-information audit also revealed a gap in provision. A number of staff said there was a need for departments to improve the sharing of information among them about their current activities and about customer needs. We envisage that a discussion group solution could largely cater for this, and plan to make it the subject of Phase 2.

Phase 3: Corporate knowledge and skills

Perhaps the most strategic proposal to come out of the review process was that the Intranet could be used to apprise all staff of the full extent of experience and expertise embodied both in its human resources and in its past achievements. The exact content of this part of the Intranet is still under discussion – perhaps summaries of past projects and products, individual skill profiles – we don't know yet, until we have undertaken a more thorough audit of information resources and staff skills. But we suspect that the emerging technologies for including selected data from databases will prove invaluable in turning what is currently a relatively static documentation-based Intranet into a dynamic, up-to-the-minute representation of the strength and depth of the organization.

And beyond: a virtual private Intranet?

And beyond Phase 3? Well, as the Institute's Intranet grows richer in content it undoubtedly becomes more worthwhile considering letting close family friends in on the secret. By that I mean selected business partners, perhaps some customers too – what has been called, I believe, a 'Virtual Private Intranet'. We shall see.

Walk, don't run

In agreeing the content of these phases in the project, we were, of course, not just reflecting the priorities for action perceived by management, but also taking account of the state of Intranet technology. Some of the technologies we shall need to use are only just emerging, so we couldn't really run before we had learned to walk. And because the main benefit of the Intranet was perceived as better customer service – rather than hammering the competition – we had no imperative to rush.

Phase 1 was inevitably going to be a proving phase, winning or losing management commitment to the following phases. It was important to be seen to do a lot with a little, so we gave no small amount of attention to the components we would need for Phase 1 – and, of course, the components we would *not* need.

For instance, there were no plans to utilize Internet email. We already had a well-used and effective internal email system. Although there was a defined need to send and receive external email via the NHS Net, we already had a software strategy in place which identified MS Exchange Server and the X400 protocol as the preferred solution.

Nor was there a need – interestingly – to utilize TCP/IP. We already ran TCP/IP to communicate with the Unix Finance Server, but the majority of network traffic – workstation-to workstation and workstation-to-server – flowed via the Netbeui protocol. Since we were a single network on a single site, we opted to use our normal networking protocol, even though this might need to be reviewed for later phases.

And because we weren't going to be using TCP/IP or the HTTP protocol, we didn't need web server software. This was all very good news for a limited budget!

So what were we left with? Well it amounted to an HTML spine which would carry most of the general information about the organization as a whole, plus – when we had won the necessary cultural battles with management – general information about each department contributed and maintained by the departments themselves.

With the spine, we had somehow to integrate a substantial number of handbooks on various topics:

- Personnel Handbook
- Finance Handbook
- Communications Handbook
- Information Management Handbook
- Staff Guidance Notes
- Staff Handbook

And, of course, we had those hyperdocuments built in the Windows Help system.

It was the Handbooks which caused us a bit of concern. They are not massive, but not insignificant either. Most pages are quite highly formatted, and the page design varies depending on the function. They are also well organized into Volumes and Sections, with a Contents page and plentiful indexes.

Now, HTML of course lacks the versatility of page layout and typographical design available in the word processing applications which produced the Handbook. Re-processing the content into HTML was an option, but one which would lose a substantial amount of the formatting. In reality, we were talking about total redesign for HTML, and we considered that an unwise use of our time at this stage. For those reasons, we looked at what Adobe *Acrobat* had to offer.

The Acrobatic way of life

Adobe *Acrobat,* of course, provides a method of converting the output from any PC application – spreadsheets and databases, as well as WP – into electronic documents. You merely 'print' the document to the Acrobat PDF Writer – 'PDF' stands for Portable Document Format – instead of to a normal printer driver. And there you have your electronic document.

Actually, it's slightly more involved than that, because the raw output from the PDF Writer lacks any kind of device to help you navigate the document. *Acrobat* can provide three ways of navigating a PDF document:

- bookmarks
- thumbnails
- hypertext links.

To create these devices, you need to process the PDF file in a separate application called *Acrobat Exchange*. But it *is* all very straightforward, although I should perhaps mention that PDF files are not known for their – shall we say – compactness!

Adopting *Acrobat* as the solution for including our legacy of Handbooks in our Intranet, led us to consider extending its use further. We wanted to include an organization structure chart, but had been horrified at the prospect of trying to implement this in HTML. Knowing what *Acrobat* could do, we therefore decided to create the chart in MS *Powerpoint*, print it to a PDF file, and to use *Acrobat Exchange* to add hypertext links, bookmarks and thumbnails.

In deciding to employ external applications like *Acrobat*, we had partly specified the HTML browser we needed to use. The browser had to handle Helper applications – like *Acrobat* – efficiently. Given that it did that, then the remaining legacy documents – those Windows Help files – could be linked-in as they were.

The great browser question

I am not going to fall into the trap of recommending either of the two 'big name' browsers. I can honestly avoid that one by saying that we are trialling both Netscape *Navigator* and Internet *Explorer*. Although the two are converging in features now, there was some significant difference between them earlier in the year in their handling of helper applications, and display font customizability. We also experienced problems with tiled background graphics, GIF graphics with transparent colours, client-side image maps, and with NT pathnames embedded as HREFs where URLs are more usual.

At one point, this – and if I'm honest, cost considerations – led us to look to see what other browsers were around which might suit our purpose. And we actually found a neat little application on the Internet which seemed to get around all the problems I have described. We are trialling that also.

It is called *Iview*, and it comes from a small Californian company called Talent Communications Inc. It's not actually a Web browser in the normal sense; more accurately, it's an offline HTML reader. It can't talk to a TCP/IP stack, so can't be used for the Web itself. But since we are not currently using TCP/IP, that wasn't a problem.

In fact, for sites like the IHCD, currently, with all resources resident on a single LAN, an offline reader can offer a number of advantages. Firstly, it's relatively cheap – just under $400 for the basic reader, which brings you a royalty-free distribution licence within a workgroup. Secondly, it has a very small footprint – only 464K – which opens up the possibility of distributing HTML-based documents, ready-to-read, on floppy disk.

Once we had warmed to the concept of a *portable* Intranet, we could then see that there could well be advantages in providing an exact replica of the headquarters Intranet on the Institute's notebook PCs for use in the field. Food for thought.

Iview works quite adequately for our Phase 1 Intranet. But as someone said recently, 'Web years really are 12 weeks'. We know we'll be changing it all again sooner than we know it – adding a search engine, using forms to collect user responses, providing an Internet gateway and inevitably at some point I suppose, embracing Java and ActiveX. But if we do, it will be because this simple Intranet generated enough value to gain the necessary management commitment.

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ASSESSING INFORMATION NEEDS: A CASE STUDY OF JOURNALISTS
David Nicholas and Helen Martin

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Editorial

"Information seeking is always an impure and incomplete activity". If this were an exam paper, the statement would end with *Discuss.* Impure and incomplete it certainly is, and the Nicholas and Martin paper in this issue makes the point very well in relation to the working of journalists. The paper must be read in its entirety in order to follow the arguments as they are developed, but the messages are quite clear for all information workers and users: information is what you want at the time you want it; the nearest and most easily available resource that does the work for you is assumed to be the most authoritative; and much 'information' is in fact recycled reporting, and part of a spiral of reading what the past wrote, and reporting it to the future. It is dangerous to ignore the parts that psychology and human nature play in information provision and use.

In the face of this user needs study (which makes almost no mention at all of technology) it is instructive to read the three earlier papers from the Aslib 'Evaluating the Intranet...' conference. One cannot avoid the heavy emphasis on technology as a means of storing, manipulating and forwarding information. But what, we must ask in the context of the preceding paragraph, *is* information? Is it making more and more things work together, or getting ever more comprehensive access to resources and feeds, or being able to ship material out of one application and into another? There are fundamental problems here of veracity, authoritativeness, completeness and appropriateness. Because a statistical model developed in a particular department can be put on a Web site and viewed by all, this does not mean that the viewers are qualified to understand the assumptions that underlie the model. They may not even accurately interpret its terminology. Inferences that are wholly wrong may be drawn from data that are correct but only in the limited domain in which they were created.

A cry of "bah, humbug" from the information profession will not do. Our profession is not particularly good at explaining why and how information changes shape and nature as it crosses cultural and special-interest boundaries. Information management is about that, if it is about anything; yet it is depressing that we still meet librarians and information workers who believe in the purity and completeness of what they handle. Actually, perhaps "bah, humbug" is quite a good response.

The paper on training (part of an informal series from Nigerian university library services) again has much to offer. The emphasis on explaining how machines work before going on to show what they can do is something that we often seem to lack in our own systems training. The paper also points up the converse – very often the understanding of 'technical' issues is left to the IT people. Only too late do the information professionals realise that their expertise has not been involved in the system design: this has therefore been carried through on what the designer assumes are the principles that matter. This was crystallised for us in the case of the library where a full analysis of requirements was carried out, leading to an evaluation of and recommendation for the procurement of a library management system. The client management decided that the system (capital) cost was too high, so revenue costing was applied instead, by giving the job of building a full system to the IT group. After three weeks of exhaustive labour (which in time costs exceeded the proposed purchase cost of the system) the analyst felt able to say that he now understood the complexity of the library, and was ready to start programming.

Contributed papers

Aslib Proceedings is always on the look-out for suitable papers for publication. It would be a pleasure to see more material coming from the various Aslib branches and groups. These need not be full papers: reports of meetings and seminars are just as welcome.

It would also be a pleasure to receive more examples of student course-work – typically project reports – that make useful contributions to current practice.

In both cases we can offer assistance with 'polishing' and tidying-up manuscripts. *Proceedings* does not have a formal review panel. Instead the editor and sub-editor apply their expertise, and call on others informally if there are matters to be clarified.

Prospective authors are promised an encouraging welcome.

Peter Gillman
Editor

Building intranet-based information systems for international companies etc...

Peter Morrell
European Management Systems plc, Imperial House, North Street, Bromley BR1 1SD.

Paper presented at the Aslib conference on 'Evaluating the intranet as part of your knowledge management strategy'. September 26-27, 1996.

Abstract

European Management Systems has for a number of years been providing EIS to international organisations. This activity has recently been extended to offering intranet solutions and this synopsis describes the research work undertaken and a case study of a live application. Other topics covered include the practical lessons learnt from the implementation, tips for successful intranet projects and cultural issues which arise.

European Management Systems plc and *Eureka*

European Management Systems (EMS) is an independent British company, founded in 1991. The founding objective of the Directors who started the company was to create a product which was a framework for the delivery of any type of data, from any source to any individual in any organisation.

The realisation of the objective was the development of an executive information system (EIS), *Eureka*. The underlying concept of *Eureka* was to produce a 'snap together EIS'. This concept provided a rich set of tools to build a high grade EIS but also enabled other tools and techniques to 'snap together' to provide a complete and specific solution to the information delivery needs and requirements of any type of user.

Eureka has been developed in the Microsoft package, Visual Basic. This development environment was selected in 1992 as the ideal foundation tool; it has continued to be so for the ensuing four years and, as will be seen later, provided the vital key in supporting the development of an intranet solution for a major international organisation.

The rapidly changing face of the IT industry has broadened the role of both *Eureka* and European Management Systems. Although EMS still specialises in EIS, the need for advice and guidance on data access and repatriation, analysis, integration and presentation has enabled it to offer services in these new areas. Data access encompasses middleware tools, analysis involves complex forecasting and interpretive techniques, integration includes images and external data feeds and presentation features graphing, mapping, colour coding and, still relevant, complex hard copy reporting.

All of these innovations are evolving against the background of changes in the physical way data are accessed and transported and this specifically relates to the Internet.

The intranet and European Management Systems

So why is European Management Systems involved with intranet solutions? The term 'intranet' only appeared with any real significance within the last year and even the growth of interest in the 'Internet' has pre-dated that by six months. The rapid change in view had taken everyone in the IT industry, including Microsoft, by surprise. This change had come about by the convergence of improvements in communication, hardware and software technology. This subtle mix can never easily be predicted but when it happens, it can be explosive. Remember for example MS-DOS, the original IBM PC and Lotus 1-2-3.

Closer examination of these new possibilities revealed that an intranet solution was a natural extension to an internal executive information system. In addition to this, because the possibility existed for two way data movement the Internet could also be used for a more extensive management information and reporting system.

Taking the broader view that organisations do not just want the narrow solution of EIS, the intranet also would form part of an information delivery system where data, text, images and even sound and moving images were integrated into an homogeneous single source of information for the senior manager, knowledge worker or functional tactician.

At a different level, any software development company must maintain a vigorous programme of research and development to assess new technologies as they emerge. Many of these new technologies will have a substantial impact on the company's product range and development work needs to start early in order to gain maximum commercial advantage.

So a combination of the on-going philosophy of investigating new technologies together with *Eureka* clients expressing a keen interest in intranet applications and the perfect fit of that with the *Eureka* product were all key drivers towards the involvement of European Management Systems in the research and provision of intranet solutions.

The intranet concept

The investigations and trials undertaken were strictly limited to the sector of the IT industry that European Management Systems is involved in so any conclusions reached relate to that sector and as importantly what is deliverable today, and not possible futures. The two primary areas where the intranet appeared to be of use were for data collection and data dissemination. It is worth examining these two areas.

Data collection

As more and more companies become operational on a wider geographic basis the need to collect data from those remote operational units becomes paramount. Standard data input screens can be built which give the ability to collect, validate and transmit data from any location world-wide. Screens can be locked on transmission to maintain the consistency of data between local and central sites. The central application can download transmitted data for inclusion in the consolidation of data from many different sites. These data can be measured against budgets and inter site comparison is also possible.

Data dissemination

Numbers, text and images can be assembled at a central location and uploaded to a Web site. This Web site is then available for download by remote locations. The amount of data either uploaded, stored or downloaded is kept to a minimum by the appliance of the 'fat client' concept which will be explained later.

Probably the most fundamental issue of this entire investigation revolves around whether the intranet is used as a processing environment or purely as a transportation vehicle to hold and move data. The overall conclusion is that the intranet is purely a vehicle for data transport. Bear in mind the criteria set for the investigation: it has to work now, it was being assessed for EIS, MIS, IDS and from the data processing perspective it is simply client/server supported with a different network environment.

The view was also taken that rather that maintaining a Web server with all the cost, maintenance and telecommunications implications a service provider should be used. The question may be posed of why not just transmit files between locations? The answers revolve around cost, mobility and availability of service. Storing and forwarding in either direction are done at the cost of a local telephone call (normally) and they can be achieved from anywhere world-wide and are available at any time. Contrast this to maintaining unlimited two way connections 24 hours a day at reasonable cost.

The issue of security was also considered during this formulation of the concept. Methods considered included password, one-off transaction code and encryption. All methods are potentially unsafe and some methods irksome to end users, *i.e.* one-off transaction codes. The security issue is minimised by the 'fat client' concept which has been evolved and again this is expanded upon later.

Where are the data held, the processing done and what is the rationale behind this? The proposition is to assemble data either locally or centrally depending on whether the project involves data collection or dissemination and uploading or downloading to a central server. All the processing is undertaken on either the local or central machines. This is dubbed the 'fat client' concept and is a common and very successful architecture in the client/server environment. These applications are more accurately known as file based applications.

The 'fat client' concept

The 'fat client' concept recognises that the minimum of data is passed between locations and that all processing is undertaken on either the sending or receiving machine.

This approach is vital when using the intranet as a vehicle. The small amount of tightly packed data can be encrypted enhancing the security aspects of sending and receiving the data. Even if the data are intercepted, a random string of encrypted raw numbers is of little practical use.

Another major advantage of the concept is the ability to store the data on a portable computer which means that they are always available for use even when communications are not possible, on a train, airplane or in a car.

For the 'fat client' concept to be properly applied the choice of the builder language is very important. It must have the power to process data as well as store, display and print them. Tests showed that this multiple capability proved difficult for the browsers in their current state to fulfil, which is why Visual Basic is used for the application building.

Choosing the first project

The correct selection of the initial project is absolutely vital in establishing the long term commitment to intranet solutions. If the project fails, for whatever reason, the damage may take a year or more to repair. The following points, while not guaranteeing success, will narrow the odds of failure.

- Rather than trying to break completely new ground it is best to identify an existing application. This ensures that problems which may arise are implementation specific and not design specific; the familiarisation and training burden for end users will also be minimised.
- When choosing the application look for a project which will give a high level of additional end-user

benefit not something which is a straight replacement for the existing system.

- Be ruthless when specifying the application. The initial implementation should be regarded as a learning exercise so large ambitious projects get in the way of that learning process. The specification should be bounded with a tight and achievable deliverable at the end.
- No project will succeed if the end-user community is lethargic and uninterested. Find a group of users who have got a genuine commitment to the success of the project and who have an interest in breaking new technology ground.
- End-user expectation is always high so ensure that some form of prototype is delivered early. This is also another good reason for making the specification both tight and realistic.
- intranet, with its image capabilities, opens up many new possibilities so when designing screens use a lot of visual interest; this in itself will add value to the existing application.

The overall objective of making the initial application tight and quick to deliver is to create a 'bridgehead of success' from which to build larger and more sophisticated applications.

Balancing the processing locations – data dissemination

Where the data are held and processed needs to be decided. Where the nature of the project is to disseminate data one single upload site needs to be established. This ensures that the integrity of the data is kept and control is absolute.

As the 'fat client' concept is applied only raw data need to be uploaded. All the real data processing, which may involve the creation of a multi-dimensional database, storing of relational data or data analysis will be performed locally.

To encourage local end users to use the system, add a lot of value to the data. This can be by sorting, ranking, colour coding or any other method which will give the users real benefit.

To increase the security and integrity of the data make both the central and local maintenance as automatic as possible.

Balancing the processing locations – data collection

Similar issues arise when designing a data collection application as with data dissemination. One site should be designated as the downloading site. This will ensure the control of the data.

Again only raw data should be transmitted; this is more efficient and increases the security of the data.

Many intranet applications involve the local collection of data for, say, weekly or monthly management reporting. In these cases data should be carefully validated prior to transmission; this also avoids reporting of the errors and the eventual retransmission of the correct data.

Another key aspect of data integrity is to ensure that the data being held locally match those of the central data; this is particularly important where the data are used as part of management or statutory reporting. The integrity of data can be ensured by applying 'lock on transmission'.

For many individuals the keying of data offers very few benefits and is seen as an imposition. This can be alleviated by adding value locally by giving perhaps some data analysis or graphing capability. This gives the local users an added incentive to provide and submit good quality data.

Again, as only raw data are being sent these data need to be processed centrally and the controls to ensure the integrity of the data need to be made as automatic as possible.

intranet in practice

The preceding points and conclusions have been the result of research which has been undertaken to assess what is the most practical and efficient approach for intranet development as the technology stands today. The following points cover the experience of an intranet application which has been developed for a major international organisation.

European Management Systems has for three years been developing a wide range of management and executive information projects for Tupperware Europe. The following application is a small intranet project written for Tupperware Europe.

The project chosen was a data dissemination project based on an existing application and requiring international access from twelve European countries.

There follows a description of the current system, what the rationale was for change and how the new system was designed. The criteria for choice of first application were strictly applied.

The current system

Part of the business process for Tupperware Europe Head Office in Geneva is to release to the subsidiary companies in Europe information about new products, updated products and combinations of products which would form product sets in their own right. The information disseminated includes data about price, how the product will be sold, identification numbers and a host of other related issues.

Associated with these data was a graphic which may have been some line art or other available image but, whatever the image, it was manually produced.

Some of the products and product sets also consisted of numerous components and as each component was individually identified differing formats of information sheet had to be produced.

The exact number of these releases per month is confidential but can be regarded at 'a lot'.

The entire process of producing the sheets was manual and when sheets had been prepared they were faxed to the twelve countries.

Rationale for change

All the data related to new and revised products are held on an AS400 and are the central and definitive source of information. One of the drivers for change was to utilise this information without any need for re-keying.

The sheets themselves were currently manually prepared and therefore required considerable effort to produce. Automated production of the sheets was regarded as highly desirable.

Although faxing of the sheets was adequate it was expensive, time consuming and the received image was of poor quality, so an easier and better method of distribution was sought.

The method of graphical representation of the product or product set was a manual process and again did not give good enough image quality. A high grade graph was therefore thought necessary.

The format of the sheet altered depending upon the number of components in the product or set so a more consistent format would be ideal.

Finally there was a strong motivation to choose a project as an intranet pilot and this particular manual system had all the ingredients to form the basis of a good initial project on which to gain expertise in intranet technology.

The new system

The design of the new system needed to examine closely the rationale for change and introduce features which would satisfy the new requirements.

The first task was to specify an extraction file which would take data from the central information source which was located on an AS400 and download them to a PC. This was a relatively simple task as it had been undertaken many times before for the wide variety of EIS applications which EMS had already developed. Additional download controls needed to detect what was new or had been amended. This automated download ensured the integrity of the data as it removed the need to re-key any data.

Each product record is identified through a unique key and, with the assiduous use of intelligent file names, it was a simple task to associate a graphical image file with the record.

A central administration function was built for use by the uploading site in Geneva. This admin function was highly sophisticated and enable the activity of any current or historic data to be tracked

[redacted]

locally for reference. The local module assembles the form in electronic form and decompresses the associated image file. The image file can also be exploded to full screen. This electronic form and its image are high grade and visually very attractive. Hard copy printing of this screen is also offered (poor hard copy printing capability was one of the major drawbacks of the browsers).

Line traffic is always kept to a minimum with only the raw text and compressed image downloaded, not the form or the full image.

Although not yet implemented the downloaded data can be fed into local *Eureka* applications. For example all new products require a sales forecast to be prepared and the new product data could be input to the *Eureka* forecasting application.

This final point illustrates that intranet applications should form an essential part of the overall information strategy for an organisation.

Practical lessons

The entire user interface should be as simple and intuitive as possible. This ensures that end users gain rapid benefit from the system and the learning curve and burden are kept to a minimum. intranet technology will only gain wide acceptance when it is as easy to use as the telephone.

End users do not want to learn complex log-in procedures so 'black box' as much functionality as possible.

A large amount of investigation was done into the production of the electronic images of the products and sets. Methods investigated included using standard film and putting it onto a Photo CD, using the new APC system with a reader to download images to a PC, using a high grade digital camera, using a standard digital camera. For the purpose of the application the best solution was the standard digital camera. It was convenient, cost effective and as PC monitors are usually low quality, high grade images are of no use. At the cost of a little speed the JPG image offered a high degree of compression with little loss of quality.

The developer tool chosen is absolutely critical to the success of the project, for the application Visual Basic was the ideal choice and recent press announcements indicate the new version will offer even more intranet functionality.

As the 'fat client' concept was applied data and version control are essential. The status of data was expectations rise exponentially with length of delivery time.

For the first application add intranet to a current system rather than break new ground. This ensures that some part of the development is stable.

Put the bulk of the processing on the local and central PCs by adopting the 'fat client' concept; this will bring the benefits which have already been outlined.

The Net is a data vehicle at present and should be regarded as such. However a flexible design is essential as the bandwidths increase so design systems under the assumption that technology changes will enable more Web based processing to be done.

Cultural and BPR issues

As with any information delivery system project, high level sponsorship is essential; it indicates to everyone in the organisation that information technology is regarded by senior management as a legitimate tool to gain competitive advantage.

End users should be involved very early in the design process and not suddenly dumped with a new piece of technology. With careful management they can contribute much to both the design and eventual success of the project.

Make the end-user training a skills transfer task over a period of time: introducing a large number of new concepts and functions can leave users with a sense of bewilderment and they will not extract the maximum benefit from the new system. As a continuation of the end-user training continue to give a high level of both face-to-face and telephone support.

If a project has been well designed and the users properly encouraged and trained then they will quickly start to demand further functionality from the application. This should be regarded as a very positive sign and, in recognition of this likely event, resources should be allocated to its occurrence.

Finally regard intranet as a key part of the organisation's information strategy; this technology is only in its infancy and will quickly change and improve.

Summary

In summary, the key issues are that firstly Net technology is good for moving data around quickly, cheaply and with universal availability, but it is still a transport mechanism.

Given that the Net is a vehicle the choice of the application builder is vital not just in its current state of development but in what the declared intentions of the authors are with regard to Net enabling functionality.

Choose the first application with the utmost care – an early failed project could put back the intranet cause a year or more. Most importantly the project should be simple and well scoped.

Do something now and learn from it. The technology may never be perfect but will improve. At least by doing something now the initial lessons can be learnt.

Currently basing the processing on local or central machines is the safest and most efficient design for an application but...

Be prepared for a very rapid change in technology and keep an open mind. Any of the design or implementation views stated here could be invalid within three months and when they are the new facilities should be embraced with vigour.

Hewlett-Packard and the intranet – case study and alliances

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Paper presented at the Aslib conference on 'Evaluating the Intranet as part of your knowledge management strategy'. September 26-27, 1996.

Abstract

Hewlett-Packard has implemented a corporate intranet to support mission-critical systems that rivals the global Internet in scale. This paper discusses the drivers and results achieved through its implementation and looks to the near future for its next evolution. Hewlett-Packard and Netscape Communications have recently announced an alliance aimed at 'Delivering enterprise intranet solutions'. The second part of this paper describes the form this will take focusing on the technology areas currently under ongoing joint development.

Case study

A colleague was recently asked to outline Hewlett-Packard's value proposition with regard to intranets. The context of the request being 'Why on earth would we consider HP in this space?'. His reply was:

> 'Imagine your market is undergoing radical change, competition is increasing, costs are increasing, margins are in freefall. Time to market for new products is being driven down, product diversity is increasing and your people need continually educating in increasingly complex topics. In spite of all these market pressures you achieve compound growth in excess of 25% per annum to become a $32bn company, and you achieve this with a marginal increase in staff.'

The purpose of this paper is to offer an insight to how this has been achieved, and the significant role technology, and more specifically HP's intranet, has played. The second element will investigate the alliance between Hewlett-Packard and Netscape and to finish, I will give a brief view of the ongoing evolution of our intranet by looking at its extension beyond the corporate firewall in support of our extended community.

To appreciate fully the magnitude of the task of supporting business improvement through technology it is worthwhile profiling the business we are in. In common with the majority of our competition, HP measures its market efficiency in a number of ways. This includes cost per order dollar in selling, customer satisfaction in support and consultancy, and defect rates in manufacturing. HP has employed intranet technology in improving efficiency in all business processes, for example the halving of cost per order dollar through system integration, standardisation and automation. This in a market where 70% of orders are for less than $5,000.

HP has implemented a TCP/IP network that we believe is unrivalled in corporate communication. To give some idea of the scale of this facility:

- 400 sites served world-wide
- 5 Terabytes of data per month
- Speeds from 100 mbps to 4.8kbps
- 75,000 PCs
- 23,000 UNIX desktops
- more than 6,000 servers.

What's more, the network is managed to internally negotiated service levels. This network runs a variety of applications, some in a secure manner offering restrictions on access, all under a managed environment called 'Common Operating Environment' (COE).

It's worth spending a few moments considering the value of COE. It takes two forms, PC COE supporting the Microsoft suite of operating systems, Windows 3.1, NT and very shortly, 95. Workstation COE offers an equivalent service to the UNIX community. COE provides a common suite of applications and services including software client/server synchronisation on a world-wide basis.

The application environments fall into three main groups: e-mail/message, file transfer and information distribution, and World Wide Web. All of the above are integrated with intranet technologies forming the glue between the pieces.

E-mail/message

HP relies on e-mail for critical business communication for both person-to-person and person-to-application (typically workflow). The HP network now supports over 100,000 mailboxes and delivers 1.5 million messages per day. Through universal connectivity it is possible to send messages to anyone in the company despite the ongoing migration from older HP3000-based system to *OpenMail* and the simultaneous use of UNIX mail systems by the UNIX community and HP Laboratories. This is supported through the maintenance of complete directories offering a simple look-up facility for anyone in the organisation.

The newest functions added to the e-mail service include integration of the messaging backbone with a workflow engine allowing transactions to be initiated and routed via e-mail. Examples of this include employee expense reimbursements, the cumbersome paper-based processes being replaced by forms driven interfaces and logic capable of routing requests for the correct level of authorisation.

Information distribution – application profile

There are many applications running on the intranet aimed at supporting business processes and supplying timely and accurate information. One example involves the provision of policy and guidelines to all personnel from corporate. To eliminate the high cost and tedium of preparing, distributing and implementing updates to binders, the system has been automated using Web publishing techniques allowing information to be freely accessed from any PC or workstation, and integrated search engines make the retrieval of information significantly easier.

The savings made, both initially and ongoing, are substantial when you consider the volume of paper-based information previously distributed and the fact that an average of one copy per 50 employees was produced. HP currently employs around 100,000 employees world-wide. Implementing a change of this nature necessitated a restructuring of roles within the unit responsible for publishing. Here, change has been facilitated through the introduction of document management facilities.

Application profile: electronic sales partner

This browser enabled tool supplies product and marketing information to the field force from the divisions (factory). It provides a single source of all information and offers a structured formal means of publishing any information pertinent to field operations.

Introduced over 12 months ago Electronic Sales Partner (ESP) has replaced a number of ageing applications, providing a common interface and single point of retrieval. This has eradicated the 'paper blizzard' normally associated with product information and allowed the culture to migrate from push to pull. Major changes and enhancements are supplemented by notification to the field force through e-mail. References to the ESP location and search keywords are distributed allowing interested parties to retrieve information in a variety of formats.

Information such as word processor documents, presentation slides, formal 'glossy' materials and Web documents are available and the COE ensures that the corresponding plug-ins are available to use.

Success factors

The decision to build a Web-specific infrastructure was taken before the explosion in interest in the Internet and its related technologies. The project to produce the Electronic Sales Partner, for example, was started nearly three years ago and took nearly two years to deliver. This means than the decision to use Web technology was taken when only public domain servers and browsers were available. Recent decisions include the standardisation on Netscape for browser and server software.

Certain characteristics of Web technology have led to concern: the increase in network traffic brought about by 'uncontrolled' browsing and the issue that there is no immediate way of understanding the impact of following a hypertext link. The proliferation of embedded high resolution graphics in Web pages has increased network traffic, if you consider a 'typical' Web page of a couple of hundred words and 3 graphic symbols equating to 150 kb of data as opposed to a 'long' e-mail of 15 kb.

This problem has in part been offset through design, the inclusion of proxy and caching servers has saved about 30% in terms of total Web traffic, and partly though ongoing education of Web users.

Education as to appropriate use of the Web has been, and continues to be, an important activity in HP. It is important that the standards of business conduct apply to this communications medium as with any other and that corporate assets are used for business use and what information is suitable for retrieval in the business context.

To our advantage, HPs culture has always included the concept of information sharing. There is also the advantage of being a high technology company: by definition the people who work here are technology literate and interested on improving the working environment. All in all, HP's culture has assisted, rather than hampered, its adoption of intranet solutions.

Lessons learned

In summary the lessons we have learned can be summarised into the following main points:

Searching

With the potential volume of information available, a simple effective means of searching for and identifying the required information is vital. Reduce the time, effort and cost of searching an unstructured environment.

Measure

Employ measurement technologies to identify bottlenecks and hotspots on the network and manage the problem before it becomes critical.

Content

Establish a means of 'formal' versus 'informal' publishing on the internal Web. There is no immediate differentiation between pages just by looking at them. Also remember if you are posting information externally you are opening up another corporate communications channel: 'cool', 'happening' and 'wicked' may not be descriptions you want to be associated with your Chairman's address to the shareholders.

Integrate

The total is more than the sum of the parts. Integrating new and existing applications seamlessly offers significant benefits.

Security

Extend your corporate security policies to internal publishing, consider authentication servers to limit access as well as passwords. Remember to establish secure communications before requesting passwords, otherwise they are transmitted in clear around the network.

Manage knowledge

Investigate specific knowledge management processes, where knowledge is created, how it is passed on, what and where it is needed. HP's response has been to develop specific methodologies in this field.

Future developments – extensible networks

There are many areas of research in Hewlett-Packard looking to exploit further the benefits of the corporate intranet. One area of significant activity concerns support for a change in working practices within the field organisation.

This activity focuses on support for remote and mobile workers. With more of the field force resident on customer site, or working from home, it is important to provide the same level of information access and support as is available in the office. A number of investigations into high speed communications, public network exploitation etc. are drawing together to ensure the needs of the remote worker are to be met.

Examples include the desire to provide timely information to the mobile employee which has led to an internal development project aimed at providing a specialised broadcast capability to deliver an unprompted message or document to the mobile employee at the most appropriate time.

The additional benefits of devising and implementing solutions based on extensible, or virtual private networks, will come as virtual organisations emerge. The ability to conduct secure business from anywhere at any time based on public infrastructure will tax the technology for only a short while longer after which we can expect to see an acceleration in the move to a distributed working community.

Hewlett-Packard/Netscape alliance

The second part of this paper describes the current arrangement between Hewlett-Packard and Netscape. The alliance, announced earlier this year, is aimed at delivering enterprise intranet solutions across UNIX and NT platforms and capitalises on the strong synergy between the two organisations. The scope of the alliance provides technology sharing, product development and joint market presence in the form of sales, support, and consultancy.

As described earlier in this presentation, Hewlett-Packard grew its intranet based on freeware products. Now for reasons of support, flexibility, choice of operating system, HP is migrating to Netscape servers to supplement the Commerce servers already installed. HP has already standardised on Netscape browser.

This will result in pulling together the core competencies of each organisation and focusing attention on areas such as:

- messaging
- system management
- information sharing
- client/server software
- printing
- consulting and support

with additional effort expended in further research into

- security
- database access

One example of this is the Virtual Vault security product which provides the core functionality to the Internet bank. Hosted on a B1 trusted operating system this product uses the Netscape suite of Web servers, one of relatively few products capable of this.

More specifically I will now outline a number of the more tangible benefits and focus areas for the alliance.

Increase enterprise productivity

A key aspect of the HP/Netscape alliance is our initiative to develop an open framework architecture for enterprise workforce collaboration, and roll out a solution based on this architecture. This solution will allow customers to

- share multiple types of information across an enterprise through standards-based APIs;
- enable virtual workgroups, by allowing corporate users to access, share, and work together on information, even though they may be in different offices or time zones;
- receive just-in-time data delivery across distributed corporations, eliminating the need to replicate data throughout the enterprise.

We have several examples of applications, both internally and as a result of delivered engagement with customers where this type of solution can improve productivity, including: HR systems, insurance claims processing, product development, customer care, sales force automation, service request tracking.

Build reliable, manageable intranet

The two companies will work together to develop intranet management for both UNIX and NT environments through integration of Netscape's line of servers with HP *OpenView*.

Enterprise customers can more easily manage multi-platform intranets and get robust management information aimed at supporting their Web server hardware and software.

Worldwide customer support
HP and Netscape will work together to enable HP's worldwide customer support organisation to provide a full range of services on Netscape products and our joint solutions. This alliance will distinguish HP as Netscape's first global support provider leveraging HP's WW network that supports mixed-platform, enterprise computing. These 'pieces' further demonstrate that HP and Netscape are committed to providing customers with a reliable operating environment.

Leverage and enhance existing investments
As part of the alliance, both companies are committed to helping customers leverage their existing investments in technology. Key areas that we will work on include:

- developing interoperability between HP *OpenMail* and Netscape *Mail*, allowing customers to use the Netscape *Navigator* client software with HP *OpenMail* and HP *OpenMail* clients with the Netscape *Mail* server;
- enhancing printing and publishing: HP and Netscape are working together with standards bodies to develop printing-oriented extensions to HTML, and HP and Netscape plan to include a customised version of Netscape *Navigator* with a future version of an HP *LaserJet* printer.

Implement intranet solutions faster and easier
One of the big benefits of the intranet is the ease and speed with which end-users can be brought 'on-line'. One of the areas we think can use more help, however, is making it easy for corporate IT departments to speed up intranet implementation. To make it easier:

- HP will resell the Netscape *SuiteSpot* and *FastTrack* server software world-wide, giving customers 'one stop shopping' and allowing them more quickly and easily to deploy solutions.
- HP and Netscape will develop consulting expertise for Netscape products and our joint solutions in the Internet services practice of HPs consultancy organisation. These services will enable customers to get their intranets running more quickly, allowing them to utilise their resources more effectively.

Local initiatives
In addition to the corporate initiatives outlined above, effort is being invested in developing close working relationships between Netscape and HP in field organisations throughout Europe. HP and Netscape are working to integrate field support activities in support of joint commercial activities.

NHSweb: a health intranet

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Paper presented at the Aslib conference on 'Evaluating the Intranet as part of your knowledge management strategy'. September 26-27, 1996.

Abstract

This paper looks at how a secure national network has been developed exclusively for the NHS, how within that network, intranet services are being established and the benefits that will be derived for the NHS itself and ultimately the patients it cares for.

What is *NHSnet*?

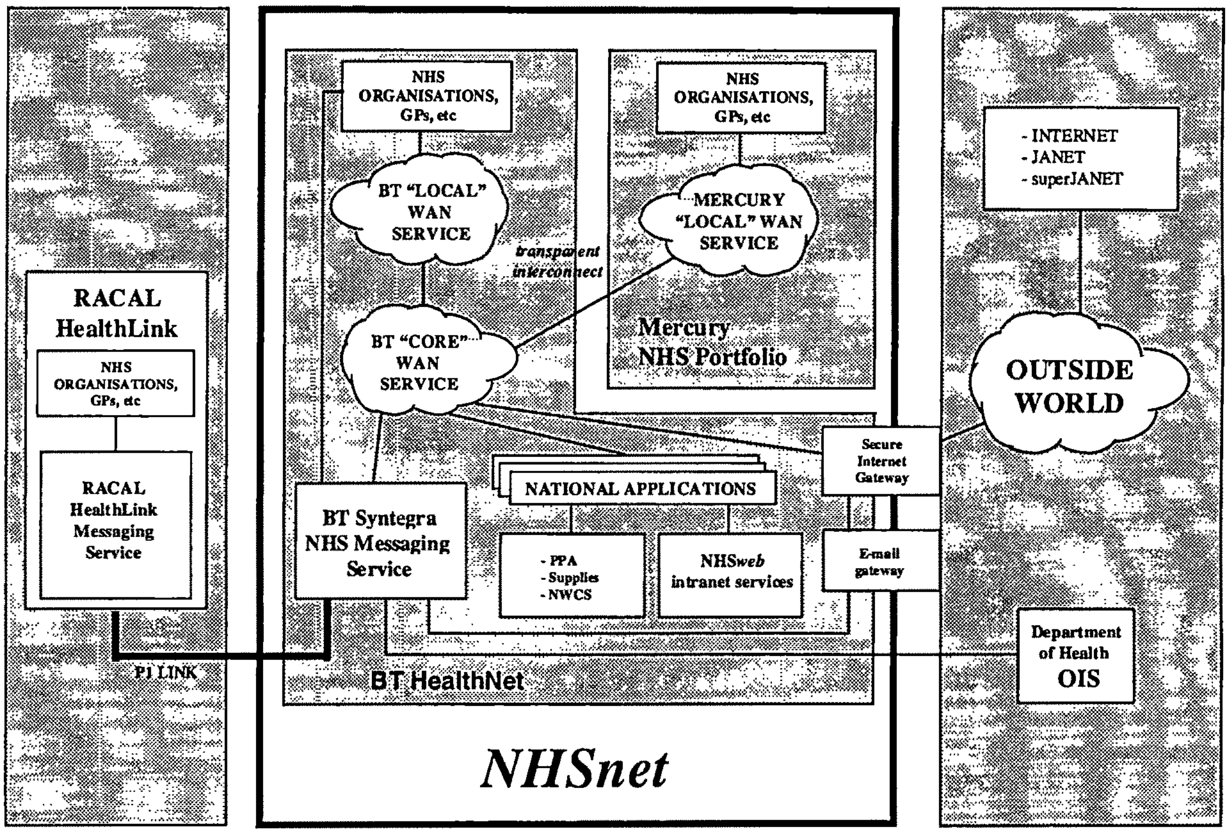
NHSnet is the secure national network developed exclusively for the NHS. This type of network is also referred to as an intranet which provides a similar range of communication and information services to that on the Internet. An intranet uses the same sort of software tools but operates within a secure and controlled environment.

It is composed of a number of services which together will support all the communication needs of your organisation, embracing both voice and data services and including messaging and wide area network services providers. As the services contracted for are managed services, capital outlay is minimised. There may be an initial cost of connection or equipment, but the majority of the costs are revenue based. This means you only pay for the services that you use. It also means the supplier is responsible for maintaining, supporting and updating the underlying infrastructure.

The diagram illustrates the services available and their links to other communication and network services.

What are the benefits ?

The ability for purchasers, Trusts, GPs, the Department of Health and other NHS bodies to exchange data and information electronically provides the potential for significant benefits in efficiency, effectiveness, working practices and the delivery of



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patient care. There will be benefits to both NHS organisations and to patients.

Benefits for patients

The electronic transfer of information supports the overall shift from secondary to primary and community care by offering meaningful co-ordination and sharing of community care. Better quality information can be provided in a more timely fashion resulting in the delivery of appropriate continuing care, either by the GP or community staff following discharge of a patient. There is also the potential for rapid access to up-to-date results/information during consultations to provide healthcare professionals with accurate and comprehensive information.

The requirement to transfer medical records amongst general practices can be more rapidly accomplished electronically, enhancing patient care and helping to achieve Patient Charter standards.

Booking of services over the network will lead to a refined scheduling of appointments and booking of patient transport services and lead to reductions in waiting times.

Benefits in value for money

A single network connection offers the opportunity to cease multiple network connections for different applications and therefore reduce local networking costs. A single connection to *NHSnet* will support access to national, regional and local applications and local area network connections.

Further savings can be achieved by reductions in stationery and delivery costs; these savings may be considerable if Royal Mail services are currently utilised as the method of delivery.

Benefits for efficiency

The use of electronic communications will allow more accurate clinical and administrative statistics to be compiled rapidly, enabling clear identification of areas where services could be delivered more efficiently. Quality of information can be improved by ensuring data are entered only once at the point of origin, thus eliminating re-keying errors. More legible data will lead to more accurate, complete information and more reliable analysis. This will include collection of data for central returns and as the information required is all available electronically, the provision of these reports becomes a less time-consuming activity.

High quality data also offer the potential for better cash flow through timely and accurate invoicing of purchasers and improved contract monitoring (GP fund holders only).

What is the NHS*web* and NHS*web* Directory?

The Internet's potential is loudly proclaimed. But its very size means that it is difficult to make sure that your information and services reach the right people, and no one else. Also, finding information and services can be a frustrating and time-consuming process for users.

NHS*web* and NHS*web* Directory remove these barriers to the effective use of the new medium. They will sit on *NHSnet* – the secure electronic network available only to NHS organisations and others meeting the Code of Connection.

A site on the NHS*web* – and the information or service it carries – will only be available to people on *NHSnet*. Also, an entry in the NHSweb Directory will allow other *NHSnet* users to locate your site – whether it is on NHS*web* or on the Internet.

We're keen to encourage innovation, so that NHS*web* becomes a high quality resource for the NHS, promoting and supporting new and better ways of caring for the health of the nation.

We're looking for information and services which will be of genuine value to the NHS, which we anticipate will include:

- knowledge bases
- bulletin boards
- education and training materials
- electronic books

NHS*web* Directory contains a powerful search engine that will let people in the NHS find the information and services they need, quickly and efficiently – either on NHS*web* or on the Internet.

As well as searching conventionally by site name, provider name or keywords, users will also be able to choose which perspective to view the NHS*web* Directory from:

- the user perspective – as GP, clinician, manager etc.
- the organisation perspective – information from or about the NHS Executive, NHS Trusts, Health Authorities, charities etc.
- the geographic perspective – structured by countries of the UK and other geographical groupings, such as the English regions.

Staff training aspects of automation in a Nigerian university library

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Abstract
Automated systems, like manual systems, will not be successful without adequate training and preparation on the part of the staff. Some problems will arise where adequate training is lacking. The article discusses the structure and organisation of on-site training of staff in the use of TINLIB software at the University of Ilorin Library, Particular attention is paid to the content of the training, trainers and what the programme is out to achieve. The article discusses some pitfalls in the training exercise and offers suggestions for future training programmes.

Introduction

As the adaptation to technology is a current issue and challenge in almost all Nigerian university libraries, many of the libraries have a problem with staffing in the use of computers to serve their clientele at a very basic level. The present need, therefore, is for university libraries to organise on-site and off-site training for library staff who will serve their constituencies with a minimum of materials and technology. While there is a growing clientele for advanced technological services, it is difficult for most library programmes in developing countries to provide for training needs of staff in the area of automation. However, training abroad offers the best option to provide advanced training for library staff wishing to take their place in an emerging information age.

About a decade ago, Ubogu and Gupta[1] identified only five institutions, information and documentation centres, where computers had been used for one purpose or another. However, the two authors observed that there was a gross under-utilisation of computers in Nigerian libraries. Plausible reasons for the seemingly slow pace at which computers are used in libraries included among others inadequate personnel, and the problem still remains till today; perhaps it will only be fair to say that the situation has improved a bit.

At the University of Ilorin library, most academic staff had some form of theoretical training devoted to automation and computer applications in libraries, archives and information systems, but there is no practical component in the syllabus of most if not all library schools in Nigeria. Students have limited access to computers through the university or department computer facilities in the various library schools.

This article gives the background of library automation at the university library. It also examines critically the effort of the library in the training of staff in the use of the newly installed TINLIB software. In spite of the fact that it is recognised that the recommendation of TINLIB is for university libraries in Nigeria, no attempt is made to discuss the training activities of other sister university libraries, though it can be assumed that the structure of the training cannot differ significantly because most of the installations and training were handled by Busicon Firm.

Background information on automation at the library

The history of automation at the university library dates to 1983. The efforts made to computerise the library advanced to the stage of data input. A series of problems were encountered at each stage of the exercise, of which some had to do with the computer machine and the supplier or vendor. These were a few of the problems that moderated the zeal with which the automation project started.

In 1994, as part of the package of the World Bank Loan Project, the National Universities Commission (NUC) prescribed the TINLIB software for university libraries in Nigeria. Consequently, the University of Ilorin was supplied with TINLIB software which was installed in the library by Busicon Firm[2], an indigenous computer company. Shortly afterwards, the Vice-Chancellor set up a committee of experts within the university community, drawing its membership from academic departments – i.e. mechanical, electrical and computer centre with few library staff as members. It was the committee that came up with a list of items of hardware required for the project.

As part of the contract agreement, Busicon Firm is to provide some training sessions for the staff of the library. To this effect, a one-week training in the use of TINLIB software was first organised off-site – at a university library located some 68 kilometres away. The training programme was attended by four academic librarians from the various sections of the university library – acquisitions, cataloguing, readers' services and the librarian attached to the computer room. It has ever been the plan of library management to make almost all members of the library computer literate. The next stage of the training took place on-site at the university library. The five-day training was organised for all academic and para professional staff. Three staff of the computer centre, one from MIS office were on hand to assist the trainers during practical sessions. A technical man, also a member of the Library Automation Committee from the Department of Electrical Engineering was available to attend to technical issues.

The need for training

As rightly observed by Juergens[3], problems can arise in the use of a computer network if staff are not properly trained. Stirling[4] remarked that 'any change in library routines will involve a staff training exercise'. It is imperative that a library which plans to have a network of personal computers must make adequate arrangements for a suitable nucleus of staff to be taught how to manipulate terminal equipment and to use it in various functions of the unit. There must be readiness to accept the training; and readiness to accept the new techniques which are initiated by their own library.

Developing an adequate staff training programme should be a critical implementation concern in any automation project. The success of any training programme will, to a large extent, depend on how the training sessions are structured. The sessions should be so arranged to provide an avenue to learning various ways in which the new techniques will affect the services rendered in the libraries and functions performed by staff. The automation at the university library costs approximately N6.4 million ($79,000) in outright purchase cost, yet automated systems, like manual systems, will not be successful without adequate training and preparation on the part of the staff.

Targets of the training and the co-ordinator

For the recent exercise, there were two major categories or levels of library personnel to whom the training was directed. The two internal levels were:

1. professionals (which include both members of the library management, middle management and others)
2. the support staff (para professionals).

A few days before the commencement of the training, the co-ordinator provided the Library Automation Committee with a description of the training and implementation plans, time frames and purposes to achieve. The overview of the training is as follows: effort was made to acquaint staff members with some bottlenecks generally that would be addressed by the use of a network for administrative support. This is important because the networks will make an impact on the processing of library materials as well as acquisitions and circulation activities. In short, the network will assist in lightening of the workload of the library.

The library, through contractual arrangement, had approached the training of staff by using the firm that was responsible for its installation. The managing director who was at the head of the team, a computer specialist in his own right, has the mental alertness and practical and analytical mind the training requires. In addition, he is good in communication language and style. He has an extensive technical understanding of the automation of library applications, but this quality was not to be found in one of the trainers and this made the understanding of the concepts introduced difficult.

Training sessions

The five-day training took place on 24-30 October 1996. The training particularly centred on the implementation of TINLIB at the university library. All other issues revolved around this main topic. This aspect of the training was introduced by the managing director of Busicon, followed by an extensive theory and practice sessions led by the general manager, Library and Information Technology Centre (LIBITEC), a subsidiary of Busicon Firm. The training was conducted in two sessions each day – 9 am to 1 pm, followed by a one-hour break, and 2-6 pm. The staff members received training in the following broad areas which will subsequently be broken down to components.

Area of training	Period
General overview of the installation	30 minutes
Basics of computers and operating systems (theory)	12 hours
Practicals on basic computers	4 hours
Introduction to TINLIB (theory)	6 hours
Introduction to TINLIB (practice)	6 hours
Network administration (theory and practice)	8 hours

General overview of the installation

The managing director of Busicon Firm gave a general overview of TINLIB software generally and how the prescription by the NUC has led to the installation in almost all Nigerian federal universities. The vendor touched on the entire configuration in brief but clear terms. The following were explained:

- the server and its functions
- backup server
- PCs or workstations which include diskless workstations (OPAC terminals, circulation, cataloguing, acquisitions and serials terminals).

According to him, the database will be readily accessible from the several different locations; the computer system has adequate hardware and software communications capability.

Basics of computers and operating systems

The theory aspects of this exposed staff to the various parts of the computer, and the various functions of the computer, and the tasks performed by the units. A full explanation of what formed the computer hardware, software and systems software revealed to trainees how the computer operates. These areas, among others, were covered:

- the computer (hardware, software and systems software)
- input and output devices
- directory (how to create, remove and delete)
- file creation
- editing
- copying
- database
- formatting
- drive labels, etc.

The quality and qualifications of a trainer are important issues that deserve attention. The trainer of this aspect, who holds the Higher National Diploma Certificate (HND) in computer science had a thorough knowledge of the network and automation, but lacked the required experience and understanding that could effectively assist in getting his message across. However, subsequent training in TINLIB removed the pitfalls.

Introduction to TINLIB

This was handled by the general manager of LIBITEC, who is a TINLIB expert. In terms of qualifications, he holds a PhD, and had taught in one of the library schools in Nigeria for more than a decade before he became the general manager of LIBITEC. He has held many series of on-site and off-site intensive training and workshops on practical computer technology and application for libraries and information centres. The quality of his training made the two sessions interesting ones. The trainer took the staff through the various modules available for the library in the TINLIB – i.e. catalogue, circulation, acquisitions and serials modules. Broadly, the training covered these areas:

- computer hardware overview
- application software
- architectural and MS-DOS operating system
- cataloguing and information retrieval
- circulation and control
- acquisition and management of books and serials
- automatic indexing and abstracting
- current awareness and SDI services
- report generation and library statistics.

The configuration, that included several PCs linked together to form a multi-user system, was adequately explained. Practical sessions that involved how to start off from a menu option, user identifier and password approach, and how to exit TINLIB, were organised and properly supervised by the staff of the computer centre and the MIS staff who were readily available. Windowing, validation, entering new records, storing a record etc. were handled by individuals on the computer during the practical sessions. Examples of book and journal titles were practically handled using templates in the four different modules. Journal indexing and how the indexes are arranged in TINLIB featured prominently in the theory and practice. At the end of the training, the trainer described the exercise as a form of orientation and remarked that a further training effort should be directed towards the effective use of the equipment in the near future.

Network administration

Induction was conducted for only a very few staff of the library. This aspect of the training acquainted the trainees with co-ordinating, operating and planning the activities that will meet service level objectives at all times. The network administration aspect revealed the enormous task involved in the use of the network-based servers. The basic function of the network administrator is to ensure that the needs of the various users of the terminals are met, ensuring continued availability of networking resources and services which is the ultimate goal of enterprise communication. The training was conducted by a systems analyst with a considerable number of years' experience. Basically, the training was structured to include these two areas:

(i) training in the management of network resources (hardware and software)

(ii) control of network usage which include
  - password control
  - software distribution
  - routine network maintenance (e.g. logging in and logging out).

Figures 1and 2 below illustrate the configuration at the university library.

Discussion

The library has succeeded in planning carefully a training session over a time frame that has actually exposed the two levels of staff to the system that is later to change their ways of doing things.

One of the objectives of the training is to develop staff confidence in the system and themselves. An observation is being made by the writer on the contractual agreement between the university library and the vendor as it relates to training. The Library Automation Committee should not have agreed to a contract that specified the number of days of training; but rather a level of training to be achieved by a certain number of library members and how that level of understanding could be tested. However, the trainer on TINLIB has recommended a further one-week intensive off-site training that will be conducted particularly with staff who will handle the terminals at the various units. The objective of this approach is to develop some staff to have a deep knowledge in automation, who will also then train others in its operation in the library – the next stage of the training is outside the contract agreement. The advantages of off-site training cannot be over-emphasised because it will eliminate distractions for staff. But in the training being discussed

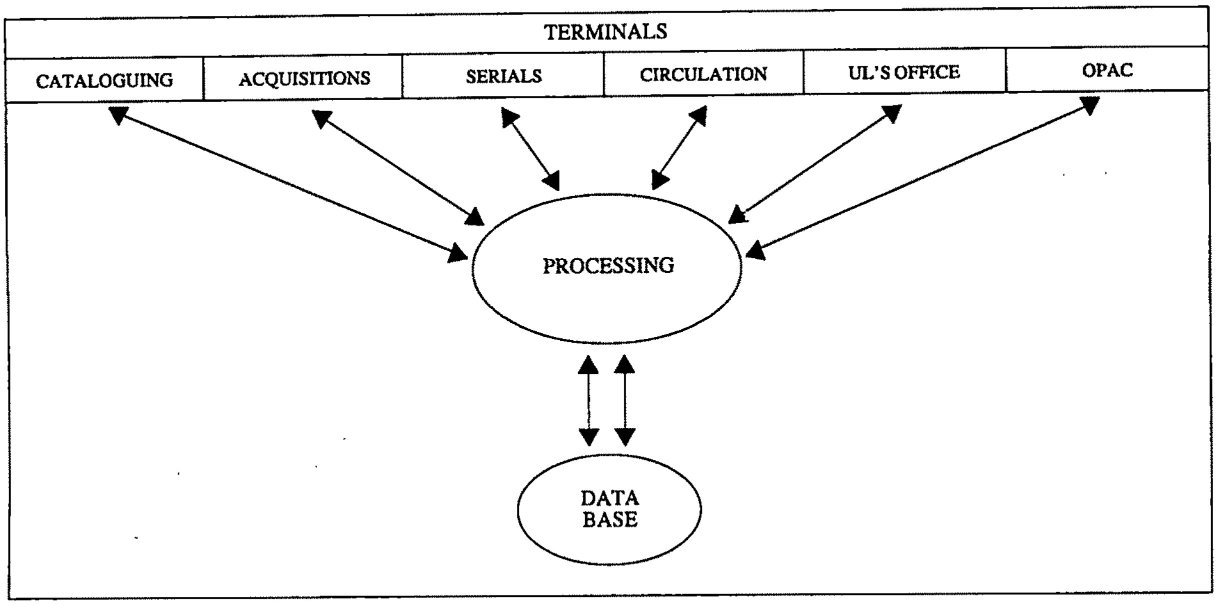

Figure 1: Computer network at the University of Ilorin library.

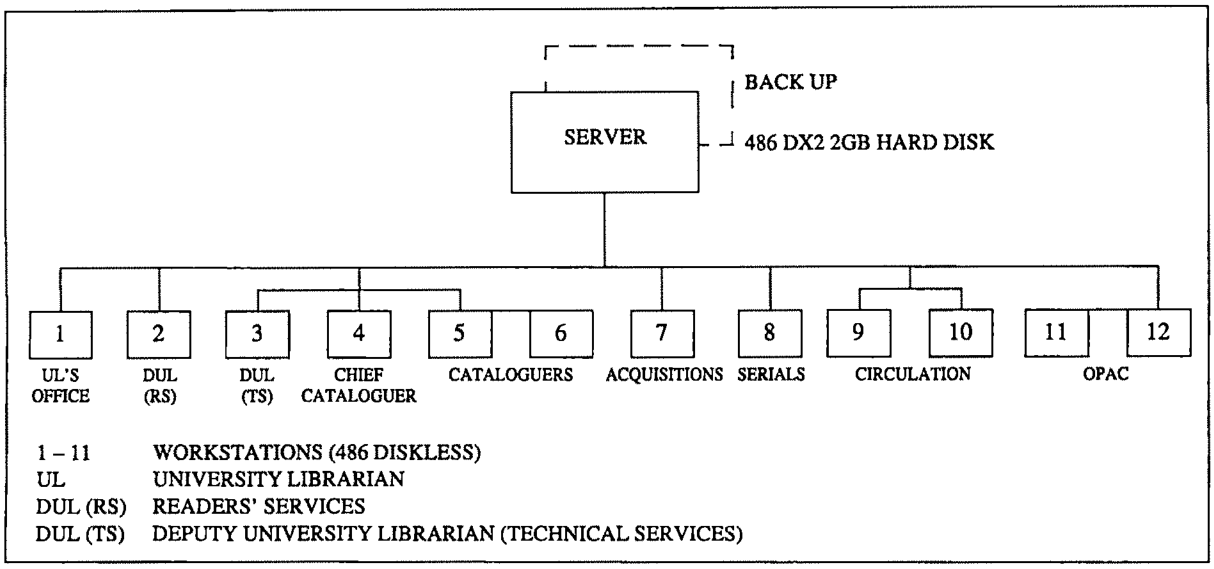

Figure 2: Network hardware.

here, Busicon Firm's responsibility in training is exactly what the contract specifies, no more, no less.

The university library seems to have kept the automation project an administrative secret from the generality of the library staff. At least three months before installation, the library should have conducted sessions that covered systems description and departmental involvement projections. The writer also observed that the training ought to have been at different levels, because clerical or support staff training requires much more delineation. There should be general guidelines which should apply to the training of this category of staff. The training should:

- group the sessions according to specific functions and levels of staff who will utilise those functions
- be such as to introduce terminology gradually, and consistently. This was a difficult area for some staff members to comprehend, having not come across some of these concepts in any formal training programme.

The trainer on TINLIB successfully placed his introduction of the programme or activity within the library context, using the functional approach. With the training on TINLIB, each staff member had a clear understanding of how his or her unit will use and be affected by the system. But the need to have a thorough training about the use of the equipment, the care of the equipment and security required, still remains. At this stage no training has been arranged for input operators in the mechanics of operating screens, and library guidelines concerning the data to be entered. From the workload point of view, the library will need to hire outside hands when the retrospective conversion of its records begins in earnest. The conversion of records in the various units, i.e. cataloguing, circulation, acquisitions and serials, is bulky and enormous. The training of hired input operators is also desirable. The training sessions should be spaced out. Spacing out the sessions will enable the trainer and the trainees to cover the material function by function, establishing a progressive level of understanding in the same order that staff members are likely to use each function.

Concluding remarks

In Nigeria, the largest professional group with current library training in automation is not found in university libraries – hence the need for training. It is absolutely necessary for librarians to be computer literate to take advantage of available information resources. Because of donor aid, or as a result of external funding, special libraries are the most sophisticated in the country in having information retrieval systems. It must be noted that advanced technological skills can best be received in the industrialised countries.

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Assessing information needs: a case study of journalists

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Abstract

A structure for analysing information needs is outlined. The purpose of the structure is to enable data on users to be collected in a systematic and routine manner. The form of analysis is demonstrated through a consideration of the information needs of newspaper journalists – a group for which user surveys are lacking. The aspects of information need considered are: subject, nature, function, viewpoint, authority, quantity, quality, place of origin, speed of delivery, and processing/packaging. Considered as well are the barriers to meeting information needs – training, time, resources, access and information overload. The library's role in meeting information needs is also assessed. The data used to illustrate the structure are taken from interviews with journalists.

Journalists have a need for large volumes of information, for very current and authoritative information, and they require their information very quickly. They are generally very well provided for in terms of information systems, sources and channels; the key problem they face is a shortage of time. Shifts in newspaper coverage, the harsh economic climate newspapers find themselves in and the information flood unleashed by IT, are changing journalists' information requirements and information seeking behaviour.

Introduction

One of the main reasons why information needs data are so seldom collected is because there is really no established structure for analysing and evaluating the data; such a structure would enable the data to be routinely fed into information system design and monitoring. There is much rhetoric about but little in the way of practical guidance for the practitioner. Indeed, some of the writing on the topic would seem to serve no other purpose than to dissuade the practitioner from attempting to conduct information needs studies in the first place. In fact Line[1,2] offered up a suitably practical framework many years ago, but the framework was presented in skeleton form only – and never developed or taken up. Indeed, Wilson[3], writing about information needs some ten years later did not mention Line's work. The reason for this was that Wilson was not convinced of the value of information needs assessments, believing that use studies were more worthwhile. Cronin, too, had reservations about the value of information needs studies[4]. However, Line's original defence of information needs studies remains a powerful one. While conceding that use is a concrete enough indicator, use data can only offer a limited view of need – use is far too dependent on provision to start with and it can really tell us very little about key needs characteristics like function and viewpoint. Use data can only help an information system improve on what it is already doing – and in itself that can be helpful, but there is no guarantee that they are on the right lines in the first place. Use data will not help build a system which will do new things. And, of course, in the case of use studies – especially library use studies – non-users are not taken into account. With this in mind the senior author has taken Line's original framework, expanded and updated it[5].

The framework provides for a systematic description of:

- the characteristics of information need: subject, nature, function, viewpoint, authority, quantity, quality, place of origin, speed of delivery, and processing/ packaging;
- the obstacles that stand in the way of people meeting their information needs, notably: training, time, resources, access and information overload.

The framework is seen here at work in the characterisation of the information needs of newspaper journalists. An examination of their information needs has been long overdue. They are, after all, fellow information providers, and they are very much at the forefront of the information technology revolution[6]. Any changes in their information needs and information seeking behaviour could provide an early warning sign for other information communities, not as yet in the information technology front line. The qualitative data used here to illustrate the information needs structure have been pieced together from 50 semi-structured, 1 hour-long taped information needs interviews with journalists from a number of national newspapers – *The Independent, The Sunday Times* and *The Guardian* – conducted both as part of the senior author's doctoral study and an information needs course he ran while lecturing at The University of North London. More details of the methods involved can be found in the Aslib know-how guide *Assessing information needs: tools and techniques*[5].

Journalists

There are many types of journalists all with their own sets of information requirements. Journalists differ according to whether they work for:

(a) a daily or Sunday newspaper. On a Sunday newspaper journalists are not tied to the daily treadmill. As a consequence they have more time to research stories and a greater opportunity to change them. They are not always responding to breaking news stories, and as a result they can plan ahead. They are also more likely to work in teams – the stories can be bigger and opportunities for co-operation can be greater;

(b) a national or regional/local paper. Journalists working on local papers have more limited geographic and subject horizons than their colleagues on the national papers;

(c) a tabloid or broadsheet newspaper. Tabloids have increasingly become an extension of TV – and it is from soap operas that they take their cue and content. Broadsheets themselves are being increasingly influenced by the tabloids.

Journalists also differ according to the department to which they belong – foreign, features or home for instance. This is partly a subject difference, but there are other differences. Thus home journalists would be on a daily cycle, whereas features would be on a weekly one. These differences are taken up in the sections that follow. Furthermore not all journalists are reporters – some are managers (editors for instance) and some are sub-editors, concerned mainly with production matters.

Information needs characteristics

Subject

Newspapers cover every subject under the sun, and as a result so do many journalists, though there is the inevitable specialisation. However, even within this very broad remit there have been changes. There has been a big increase in lifestyle reporting. Marketing departments on the papers concerned advise newspaper editors that the public are soon satiated by bullets in Bosnia, starvation in Africa etc., but they cannot get enough of holiday, health and food features. The ramifications of this go beyond subject, for this type of information also tends to be sourced differently – not from people or broadcasting channels, but from the paper publications of relevant institutions in the field. For the journalist it represents much more a processing and packaging job. News stories are usually written – when at all possible – through the experiences of people, but lifestyle information has far less to do with real people.

Of course, journalists are far from being a homogenous group. There is a whole range of specialist journalists, whose information needs are very different from the stereotypical news reporter. At *The Guardian*, which employs approximately 240 journalists, the biggest group are the Home Affairs reporters, whose brief might be to cover any subject at very short notice. With such an enormous potential brief it is not surprising the library hears most from them. Then there are Features journalists, responsible for the womens' page, arts and various lifestyle topics. Then there are the Foreign reporters and foreign desk, whose subject needs are very wide indeed, but always contained within geographical boundaries; the City journalists, whose subject needs are well defined; the Sports department, which is composed largely of sports enthusiasts, who have a very narrow brief – they might specialise in cricket or rugby, for instance; and then all the sub-editors attached to all these areas. Additional groups which are superimposed on these basic ones are: specialist reporters, who have a responsibility for specific subject areas (e.g. medicine, social services) – they have one of the narrower subject briefs, if you can call education, defence etc. narrow; and the smaller group of assorted managers: assistant editors, senior editorial management and departmental heads, who, despite their significant management concerns, still see their main job as keeping a watching brief on news generally – they use wires, newspapers – and sometimes *FT Profile*, to do this.

Journalists, in their attempt to communicate to the intermediary the subject of their concerns, often provide vague and generalised descriptions of what they want. They do this because:

- confidentiality concerns lead them to camouflage their interest – so that other journalists are not alerted to their particular line of enquiry. This happens especially in the case of journalists who work for organisations that house a number of papers, as is the case at News International;
- they cannot do otherwise – vague subject specification mirrors the journalists' own uncertainty as to what they want: it is difficult for them to articulate their problem, although they will recognise what they want when they see it;
- of a certain professional arrogance – they do not understand why the information professional should want to know so much about *their* work.

There is a tendency to exaggerate the extent to which journalists' needs are broad and undefined for in many cases they know exactly what they are looking for and frame their queries in very specific terms. And this can be seen most clearly when they go online, for searches are largely undertaken on names of people and organisations.

Function/purpose (to which the information is put)

Essentially, journalists need information for five broad functions:

1. Fact-checking. For example a journalist might want to know the relevant parties associated with a merger involving a stockbroking firm or simply

check the publication date of a particular article or check what they wrote (reporters possess more information than is released through their stories and it is sometimes important to check what they have told their readers). Journalists like using online services for fact-finding. A leader writer gave this example of a typical search: *Margaret Thatcher is much quoted as saying 'I have never said unemployment would fall'. Now this is the sort of comment that is easily remembered and mis-reported. When did she say it, and were those the exact words – Profile would provide me with the answer.*

2. Current awareness. Everyone in a newspaper is concerned with keeping in touch with what is going on in the world – and they do this largely through wire services, television and newspapers. Journalists are obsessed with anything that carries news. During any spare minute of the day they will be found reading newspapers. Specialist reporters keep up to date in a more traditional and focused sense: they read the books and journals of their particular specialism, rather as an academic would. City journalists, illustrating the currency of their field, sometimes use online services to keep up to date. One City journalist at *The Guardian* did his current awareness searches at lunch time. City journalists are probably unusual in running this type of search, though foreign correspondents have shown an interest, too – *The Guardian*'s South African correspondent uses CompuServe's SDI facility.
3. Researching. Print journalists in the UK do their own research, but they do delegate some of it to the library – this happens at *The Guardian*, for instance. The following example gives a flavour for the kind of research journalists conduct on-line: at a car company's annual meeting the chairman talked a lot about the Japanese car industry. There was nothing new or exciting about that, as he did that all the time – constantly denigrating Japanese achievements in the field. However, with *Profile* the journalist can make a story about it. The number of times the chairman had repeated these criticisms could be checked and then an article written along the lines of *Chairman of company X attacks the car industry for the nth time.*
4. To obtain a context. The following quote from a City journalist illustrates the kind of approach nicely: *There is a mass of detail passed on by companies over the years and you can only remember the main companies and personalities connected with them. Now there might appear on the tape an item about a company that rings a bell; but you do not know in what context you've come across that company before. You would then go to Profile, look up the company name and suddenly the story is a story on Mr X rather than on a company nobody has heard of.* There is always the need to ground a story, a need to set sparse information in context, provide a brief history or summary. No stories are sufficient in themselves, something similar has always happened before (and by knowing what has happened before and demonstrating it the story gains authority). Generally the library is called upon to provide instant background data. The cuttings files held by the library are an especially prized information resource.
5. Stimulus. In the above cases journalists know generally what they are looking for, though the level of specificity and certainty varies somewhat. However, in this particular case they do not know what they are looking for. Features journalists are often in this position and frequently stumble upon information when they are looking for something else. It is the unexpected that many journalists feed on, and it could be argued that computerised information systems increase the opportunities here: in fact they bounce their ideas off information sources and systems. Because the searching associated with this particular need is inevitably unfocused and unstructured, intermediaries who observe it are often led to believe that what they are witnessing is poor searching. In some cases this might be true for research does show that they have a poor grasp of system commands[7] but sometimes it is just a reflection of not knowing what they want. Of course poor searching itself may accidentally serve a purpose.

Nature

There is not an ideal label for this information needs characteristic. A clearer idea of what is involved can be obtained by listing the various types of information that fall within its compass: whether the need is for conceptual or theoretical, historical, descriptive, statistical or methodological information. Journalists are trained and able to deal with information of all kinds, but most of the information they require is of a descriptive and historical kind – their heavy use of cuttings files and oral sources is testament to that. With the arrival of friendly graphical packages newspapers have shown an increasing interest in presenting statistical information to their readers. Of course, City journalists have always been big users of statistical data.

Intellectual level

This characteristic refers to the minimum extent of knowledge – and sometimes the level of intelligence – required by the user in order to understand the information. It is all to do with the intelligibility or otherwise of information. Journalists are generally clever enough to penetrate even the most dense texts, but whether they have time to do so is another question. And, anyway, it is to the specialist correspondent that most of the intellectually demanding material goes – and they are better equipped than most to deal with it. It is probably the science and

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medical correspondents who suffer the most problems for they have to read highly technical pieces and explain them in layman's terms. This has been known to break a few journalists' reputations, when they have got it wrong. With a political correspondent point of view can always be argued in defence of a story, but it is not so easy for the medical correspondent to do this.

Journalists obtain much of their information through the telephone or personal contacts. It is not just speed that dictates that this should be so, but also the need for understanding the data and issues. Without personal contacts – and the prized contacts book – there would be a real danger of misreporting or misinterpreting a story. *If journalists lost their contacts books they would be unable to work effectively. They build their books up over decades.*

Viewpoint

Information can be written up from a particular point of view, approach or angle, and users may require information sympathetic to the views that they subscribe to or the point they are trying to make. Viewpoint is a very important needs characteristic for journalists, though what complicates matters is the fact that on the one hand they seek out information presented from a particular viewpoint – often from a negative one – and on the other hand sometimes write stories from a particular – usually political point of view.

Journalists' quest for objectivity can get them into trouble – people complain that they are anti-establishment because of the negative way they comment on government, politicians and political parties. But in their defence they would argue that they are important information counterweights: government and commerce are always putting a gloss on bad news and their job is to correct this. They point to the army of public relation specialists and the firms that groom important people on how to conduct an interview with the media: all in an attempt to present information in a good light. Journalists are generally convinced there is 'dirt' out there somewhere, and their expertise is in finding it. According to investigative journalists you can find dirt in even the most unusual places. Thus Government is known to use obscure documents, like minutes of various committees or parts of documents like appendices to publish information that it has to but would rather not. Select committee minutes are sometimes a must for the investigative journalist. There is some sympathy for the likes of Martyn Lewis of the BBC who first raised the issue of too much bad news. But one editor said that it was unrealistic to expect anything else, because *war is always more interesting than peace in the public mind and the fact that one plane has crashed is always more newsworthy than an item saying that there had been 1,000 flights out of Heathrow and not a single crash.* Also he points to the ludicrous nature of such headlines as *another quiet day in Norway.*

In common with politicians most journalists do not mind bias and viewpoint as long as they can identify from where it comes – and in this most journalists know where their Fleet Street colleagues stand. Hence their trust in newspaper cuttings: as one journalist said *you have that innocent faith in the person who wrote the previous stories.*

Quantity

Journalists have large and insatiable information appetites. The large number of information inputs that are a feature of all newsrooms are a testament to that: television, radio, wire services, online databases, e-mail, fax, mail and banks of phones are all there. The need for so much information comes partly from their wide brief, partly from their need for currency and, maybe, also because they do not know exactly what they want until they see it – and the more they see the better. The fact that stories unfold and change in the course of matters, and some of them are dropped as a result, also means that journalists get through a lot of information, and are generally wasteful of it.

As a result of the plethora of channels which direct huge amounts of data into a newspaper in oral, broadcast, paper and electronic form, journalists find themselves wallowing in information. Wrestling with this all-consuming flood is very much part of a journalist's daily work. So a high proportion of information handling carried out by journalists concerns information which is not sought and much information seeking is undertaken to provide explanation and context to this information.

While all newspapers have witnessed a frightening increase in the number of information inputs into a newspaper and a consequent increase in the volume of information coming in, this has been ameliorated by the fact that previously paper inputs are now coming in electronic form – a form far more suitable for distribution and storage. Interestingly, of all the 'new' communication technologies fax has probably had the biggest impact in volume terms. A newspaper may receive thousands of faxes a week. Indeed, so many that it sometimes difficult for journalists to fax out. E-mail looks set to follow in fax's footsteps.

Unlike academics, who also need large quantities of data to do their jobs, journalists do not require comprehensiveness or exhaustivity because they always have to stop at a seemingly arbitrary point – the newspaper deadline. So information seeking is always an impure and incomplete activity.

Quality/authority

Assessments of the quality of information or the authority of a source may be subjective, but, nevertheless, quality figures very highly in the mind of the journalist. Broadsheet newspapers in particular are held in high esteem by their readers and to ensure that they do not blot their copybook by using inaccurate sources journalists always like to cross-check the data. Typically they do this against other news services or other papers, which are also rushed and grabbing at information – so mistakes are sometimes compounded. However, despite the tight time scale newspapers work to, journalists believe that there are so many checks and balances in the system – the data are checked by a whole series of individuals and the data come through in so many forms (radio broadcasts are even transcribed for this purpose) that accuracy is near-guaranteed. Even so journalists and newspaper editors have to stand by what they publish; they cannot use the excuse that they obtained it from another source.

This does not necessarily mean that they implicitly trust seemingly authoritative information. Take the case of the copious documents that emanate from the Treasury at Budget time. Probably no journalist would dispute the figures presented there, but it is what these figures mean, the implications, that concern them. Thus no government document would announce that, say, half of all the schools' drug advisers will be sacked as a result of the budget, but that is what the figures may mean – and it is for journalists to spot this.

Unpublished documents and oral sources of information pose special problems to journalists in terms of their authenticity or accuracy. This is particularly so for investigative journalists, who rely on leaks, forwarded memoranda etc. for much of their information. There is obviously no real problem when a memo is leaked from, say, the Auditor General's department. Its authenticity comes from the letterhead (though even here there was the recent case of the faked House of Commons notepaper). It is probably oral sources that give the biggest problems, for they have no authority markers and in their case they cannot be rigorously cross-checked, something which is usually done informally. Because of this journalists always prefer to have a document, though sometimes being caught in possession of a secret document can have its repercussions.

In the case of documentary sources it is PR material which causes the greatest difficulty. The vast bulk of mail that comes into a newspaper office is pure PR material. So much of a journalist's time is spent dealing with metres of paper every day and using his or her intelligence to make judgements about whether the document from IBM is worth throwing away or not. A senior editor pointed to the waste of it all: *What concerns me is the money that has been spent in providing all that paper – postage, marketing departments full of highly paid people. And to what end? Millions are spent every year in filling news desks' waste paper baskets.* All this material is filtered out of the data stream at a very early stage. In the rush to get to the bottom of the pile sometimes mistakes are made: *there is always the fear that you've just dropped Peter Wright's manuscript in the paper basket thinking its a press release from Glaxo!*

In the case of electronic sources it is not just the Internet that causes concern over the authority of its data – wire services do, too. Thus, while newspapers subscribe to a host of wire services – at the very least, the Press Association's PA, Reuters, the US oriented Associated Press (AP) and the French wire, Agence France Presse, the PA, for home stories, and Reuters, for foreign stories are held to be particularly authoritative. Gauging the accuracy of wire services is especially important because when newspapers subscribe to these services they get the right to lift these data straight into their newspaper – a huge temptation now that they sit in the editorial system, where they are easily manipulated.

Currency/date range

The tremendous competition between newspapers to publish first – to scoop each other, means that up to date information is in great demand. It is by having the most up to date information, or the first release of it, that newspapers prove they are the best. Currency is thus a strategic information needs characteristic. It puts on sales and enhances a newspaper's status.

Given journalists' preoccupation with events as they break and their stringent currency requirements, it would be easy to make the mistake of believing that they only ever required information a few hours or days old. But this would be to underestimate their need for background information to support the breaking stories they obtain from more current (the wires) and less public means of communication (the telephone). In fact it was found that a fifth of all *Guardian* journalists regularly required information more than two years old. Indeed, a number of journalists would like to search *as far back as she [FT Profile] goes,* and *to the beginning of time.*

Speed of delivery

Obviously information should not go 'off' in transit – and news has a very short shelf life indeed. Clearly, for any process in which there is a tight deadline and where the medium being processed is always unpredictable in its appearance during the working day, speed of delivery is going to be always a major requirement. The fact that many of the information inputs into a newspaper are real-time – wire services and television, for instance – shows this to be very much the case. Journalists have to absorb information extremely quickly so invariably it has to be obtained quickly. Home and foreign news journalists are the most demanding users of all: they require facts and background data very quickly, and usually at the last minute. Of the two sets of journalists, home news journalists are under the greatest pressure – covering news on the ground as it breaks. Generally speaking the closer to home, the greater the pressure for rapid reporting: after all if we in Britain hear about an earthquake in Japan eight rather than six hours after it happened, it makes little real difference: but the announcement of an interest rate cut is quite another matter, and in these circumstances minutes matter. Having said that there is also a need for very rapid reporting from war zones.

With having to get information so quickly much information gathering is conducted over the phone. It is estimated that the five people manning *The Guardian*'s newsdesk would typically receive six phone calls each in the space of 45 minutes. The telephone is the most important reporting tool. One phone call leads to another and that is often how a story develops. As one journalist explained it is just like researching a book and checking the bibliographies to see if there are any more like-minded books to extend your research. Telephone research is much like that, but it can be done much more rapidly. Take scandals as an example. The journalist might start off by phoning a particular person or organisation, whom he or she knows possesses expertise in that particular subject. Most often people will talk to them and say "I can give you so much but why don't you ring so and so for more". And then it simply becomes a matter of time, because journalism, unlike academic research, is carried out in a short and finite period of time.

Place of origin

Place is a very important characteristic for journalists, for, after all many newspapers divide their content along geographical lines. The division into home and foreign pages is a time-honoured one. Wire services and the ubiquitous CNN provide the foreign desk and leader writers with information from around the globe in real time. Newspapers simply do not have the resources to have journalists always on the spot. Thus for instance *The Guardian* has just two journalists to cover the whole of Russia. The problem for foreign correspondents is not just getting information on some very secretive regimes – once a problem for journalists operating out of the Soviet Union – but with finding out what the rest of the world is saying about events in their patch, for communication lines are often poor. For regional journalists quite a small geographical area will be the prime concern. Wire services – with the exception of PA, which covers regional news – online databases, national news and books and magazines are going to be of limited value here; instead the phone and the interview come into their own.

Interestingly the Internet, with its enormous geographical reach, is impacting on foreign correspondents in an unexpected way – it has taken away some of their responsibilities. The case of the Washington correspondent of a major national newspaper is illustrative. Before the Internet came along he would explain to the newsdesk in London what was the big story in the United States and write about it. Now London is searching the Internet and forever telling him what story to cover. A consequence of this apparent mistrust of people on the ground is that sometimes they get it wrong.

Processing and packaging

Journalists are processors and packagers of information themselves and are very suspicious of other people performing these functions for them. In consequence they have a strong aversion to abstracts and some are even suspicious of *FT Profile's* context displays – a display that shows the paragraphs in which the search terms are embedded. However, they do appear happy with the highly packaged and processed products of their fellow journalists. Thus a feature of all newspapers libraries is the massive cuttings files. Cuttings are prized so highly because because they are such a familiar information package: the journalistic groundwork has been done for them and the necessary patterns assembled. Armed with cuttings the journalist's job is both quicker and easier.

Obstacles to meeting information needs

There are a number of factors that prevent journalists from meeting their information needs. The principle one is time, but access problems, information overload, and training are also influential.

Time

To most users a shortage of time to find and digest information is the real obstacle to their meeting their information needs. This is probably more true about journalists than any other group; but they actually seem to enjoy this fact. They explain that *it's a pressure you get used to, and there is something extraordinarily pleasant about it.* It is largely a self created pressure, a challenge which they need and they respond to. Pathologically and psychologically they appear to be incapable of preparing material the day before the item is due. *If you give someone three weeks to do a story, they would still be hitting the keys five minutes before the deadline.*

For journalists the time pressures and constraints – always intense – vary according to the type of newspaper. These pressures are greatest on the daily papers and even more so on evening papers, like *The Evening Standard*, for they have to be ready by lunch time and go through a large number of editions during the day. Information has to be got out of the word processor and on to the street in 40 minutes. This creates enormous pressure. *The pressure is to get onto the phone and to dictate a story because if you did it then it could be in the 4th edition. If you did it in half an hour it would be in the 5th edition.* At Sunday papers the pace is more leisurely. With 52 issues per year the average Sunday journalist would probably get in print once in 2 weeks, writing maybe 30 articles in the year. Whereas the average *Guardian* journalist would certainly do 6-12 a week, and that obviously means some would be quick pieces accomplished in an hour or two.

Features journalists are like Sunday journalists in a way, for they know in advance the story that they are going to write and have (in theory) more time to research and write the story because they are not tied to a daily publication cycle. It must be remembered also that, contrary to popular perception, journalists seldom run stories cold and this is particularly the case with specialist journalists – the political, labour, social services and education staff for instance. Over the years these people do their job they build up considerable expertise. Thus for the educational correspondent, when an Educational Bill is published on, say, Friday, that does not come as a shock because they already know a great deal of what is going to go into it. They have probably spent weeks talking (over the phone) to teachers and civil servants about it beforehand. Probably the best example of journalists gathering information in anticipation of events occurring is in the case of obituaries. Most news organisations have filing cabinets full of obituaries just waiting for the announcement of a death. *The Times* for instance has as many as ten people filing obituaries on every personality in the world.

It is probably sub-editors who have the least amount of time on their hands. They have a need to check, cross-check and verify information – like spellings and facts – literally within minutes. Because of the speed and urgency with which they work, they commonly fail to find what they want and in these cases have to edit the data out. Journalists' acquisitive natures help them through difficult times. By constantly picking up documents, soaking up information and husbanding it they are ready for the day when they need it, but given little notice.

Access to information sources and systems

Journalists are very generously provided with information. In fact for some journalists there is just too much in the way of information: *there is much online, so much CD-ROM, so much everything, everything totally available – it is a nightmare.* Newspapers go a long way to create a climate conducive to information acquisition. Hence all newsrooms are open plan. At *The Guardian* a conscious decision has been taken to produce a shared information environment in the newsrooms. The respective editors want to create an open information system where everybody is party to everybody else's information. Thus phone calls are taken so that others may hear, discussion is deliberately pitched so that everybody who wants to is part of it, and everybody has access to the entire wire output. Everybody should be listening to each other – that provides the necessary checks and balances in what is a frenetic and pressurised environment. By so doing editors believe that journalists' understanding of events will be improved (and hence their stories); it creates a consensual atmosphere; also, it is an insurance policy which ensures nothing is overlooked, nor are connections missed. Of course, because phone calls can be heard this can also prove to be a distraction.

Thanks to continued and increasing investment in information technology by newspapers access to information has been greatly improved. Take the computerisation of newswires. This has had a greater impact – and a largely unrecognised impact – on journalists than most other forms of computerisation. In the days of the paper wire its distribution was a complicated affair (employing a person called the copy taster to do the job) and few people saw more than a few snippets from the wire. Nowadays anybody can browse through the whole of the wire service output, as it is networked around the building. There is always a downside with a technology, and in the wires' case it is simply that if someone blinks, takes their eyes off the screen something very important can be missed (though an alert messaging system helps to prevent this happening). You do not absorb screen information as thoroughly as you would paper information. At least now maybe a dozen pairs of eyes are watching the screen.

Despite the fact that newspapers are inundated with information and exceedingly well provided with information systems it is by no means always easy to get hold of the information that is required. This is because newspapers are partly about disclosure and many individuals and organisations are actively trying to prevent them doing this. Therefore the best stories are often those which take quite a lot of digging. And the digging largely starts with the Government, which to many journalists' minds exists mainly to keep information secure: *Government is not in the business of communication.* The same thing is often true of industry and commerce, where companies are usually reluctant to divulge information unless they think journalists are helping them in their sales or marketing exercises. The information that is made readily available is too often either of the PR sort or the kind that has to be supplied by statute. Naturally organisations which are active in the public domain have a lot of in-built mechanisms for doing very important things outside of the public's eye, i.e. *they present an acceptable public face while doing interesting, controversial or sinister activities behind closed doors.* Good journalism is about finding out about such activities.

On a newspaper, journalists do not just compete for information with journalists on other newspapers, but also with their own colleagues – few journalists are lucky enough, or important enough, to be guaranteed space, or a particular space, like the front page, which is in much demand. As a consequence certain kinds of information (exclusive, scarce, privileged) are not shared. Journalists jealously guard their contacts and would be reluctant to share some of them with their close colleagues. It certainly seems odd that a group belonging to the communication business should be so secretive by nature. But it is largely to do with the glamour of newspaper reporting – everybody wants to produce a scoop or be part of an exclusive. Insecurity also has something to do with it – journalists are easily and frequently hired and fired – and they all have a sense that the good times might run out. This engenders competitiveness, which inevitably leads to secrecy. The confidentiality issue though can be overplayed and over magnified. Specialist journalists are often used as sources by their colleagues in the news room and *The Guardian* now maintains a database (anonymously contributed) of politicians', actors' and other personalities' phone numbers.

Foreign correspondents – geographically removed as they are – probably experience the greatest access problems. They can find themselves cut off from the international information flows. At *The Guardian* Moscow and South African correspondents were once cases in point. Foreign correspondents need all the information that they can acquire, and in this respect, online services, e-mail and the fax provide an information lifeline. Any journalist working in the field, remote from the information that floods into the newsdesks is going to feel isolated.

Information overload

Journalists are bombarded by information – it comes through the post, the e-mail, the phone, the television, the radio, other newspapers, the wire services and now through the Internet. Far too much information comes piling in for comfort (*we have a thousand times too much information).* Thus each newsdesk gets a metre of mail a day. The vast majority of it is never used, but because a journalist cannot leave any stone unturned it all has to be (briefly) looked at. At their peril they ignore it. It is estimated that of the paper flood some 90% is binned immediately: of course no one knows how much electronic data would meet the same fate.

The presence of such vast quantities of information can lead to problems other than that associated with trying to digest/process them. Indeed, it can lead also to an unbalanced view on events. For the danger is to rely on the incoming paper flood and in so doing obtain a far too institutional view on events. Take the example of *The Guardian*'s Education correspondents. For a start they would get upwards of about a metre of post a day from educational institutions, pressure groups, and trade unions. It is all institutional, it is all about providing education – and little of it is consumer oriented. It is not about what is going on in the classrooms, it's not about what parents are wanting etc. To get that information they must leave the office. *But that can take a tremendous act of will, for the pressure is to stay in the office and read the post and take the phone calls.*

The incoming flood has another effect, for what with 24 hour news television services, like CNN, newspapers rarely originate information – journalists spend much of their time editing and selecting from the information that comes to them. This has become increasingly the real journalists' art. Specialist journalists are especially in danger of being slaves to their postbag. Bombarded as they are with PR, reports from august bodies and learned journals, the temptation to repackage and recycle is great. The trouble with this is that the specialists gets closer to their subject communities and more detached from their readers. Journalists are probably doing more of their information seeking in the office itself – a place it is alleged where the managing editors would rather see them. And while this is much to do with computerisation it is also to do with economics (no expense claims). Newspapers are no longer the rich organisations they used to be – they simply cannot afford to fly journalists out to every troublespot.

Training

There can be no doubt that journalists are not only highly motivated information seekers, but also practised information seekers. They obtain some training at journalism school, but mostly they learn on the job. It is almost impossible to get a journalist to a training session of any kind. Attempts to train them in the use of *FT Profile* have usually ended in abject failure. They generally show an interest in the idea of training, but the reality is something they all fight shy of. So far this does not seem to have disadvantaged them too much, because: (1) they have so many sources of information to choose from; (2) when it comes to information retrieval, they are never seeking perfection or comprehensiveness (3) they have the wit to work a source for its strengths. This does however lead to a lot of unevenness in the skills journalists possess and their general awareness of the value of computer sources. Thus at *The Guardian* you have the situation where one journalist might be using *FT Profile* several times a day, and another journalist sitting alongside does no searching at all. However, with the increasing computerisation of the newspaper, a yawning gap is emerging between the skills of the more IT literate journalists, who tend to be the younger ones, and the older journalists. Thus it appears that it is only the young journalists who are embracing the Internet into their work routines.

Conclusions

The chief characteristics of journalists' information needs are: the sheer size of their information appetites; their requirement for authoritative and current information and the speed with which they need information. The biggest obstacle to their meeting their needs is lack of time, but even so many journalists regard that not so much as a an obstacle, but as a challenge.

There are big changes taking place in journalists' information needs and information seeking behaviour – and computerisation is largely seen to be the agent of this change. The trusty information package – the cutting – is being increasingly replaced by printouts, downloaded *Profile* files and bookmarked Web sites. Until quite recently overload has not been the major problem – journalists' skills and the filtering systems in place in newspapers ensure that. But appetites could be sorely tested by the Internet – as could the requirement for authoritative data. Journalists appear to be relying more on the information that comes to them and less on information they create themselves.

Journalists also talk less to each other. This is what one newspaper editor noted after the introduction of a computerised editorial system. *Now it is quite noticeable that there is a tendency for people to give up speech. Partly it is fun and partly it is to do with institutionalisation – sending your messages to everybody on the screen, even if they are sitting next door. In the old days people would tend to stop what they were doing, look up and say something across the desk: that struck me as a fairly rapid means of communication. Today they do not look up – just key in a message.* Since then e-mail has taken matters even further. Journalists now increasingly work from home, maintaining contact though e-mail, which further reduces face-to-face contact. Editors readily admit that this could have a huge impact on the general feel and cohesion of a newspaper because a paper is more than the sum of its articles. This problem is further compounded by the move to employ more contract staff, who hardly ever come into the office (or library).

Huge forces are threatening to transform the information environment of journalists further. These forces are being ushered in by the Internet. Of all professional groups the Internet seems set to have the most immediate impact on journalists. After all it can provide them with (almost) instant access to an ocean of information and opinion that was not available to them before. It is an ocean they cannot ignore because any drop in it might prove of value to a profession with such broad information horizons and never certain of precisely what it is looking for until it sees it. The Internet has also had some unexpected repercussions as we have seen in regard to foreign correspondents.

Finally, whither the library in all this? For journalists the library is insurance, a comfort blanket, a fallback, an underpinning. With a library they do not feel alone or exposed. But in a workplace so full of alternative information systems and with a group as practised as journalists the library can never be the be all and end all that it can be in academe, for instance. The library's role is limited. As one senior editor explained journalists should never be over-dependent on the library, for this would be dangerous. Journalists should assemble data from a wide variety of sources and systems and sew the whole lot together into something resembling a patchwork quilt. The very essence of reporting is to tell people what they do not know already – and by definition cuttings, online hosts and libraries tell you what is already known – possibly widely known. Perhaps with so much information available to them and so little time in which to consider it, it is not surprising that journalists do not place libraries at the top of their information agendas. In this they are quite unlike national politicians[8]. But then the newspaper library is not regarded as a source of specialist expertise or research, though this might be slowly changing thanks to a growing professionalism amongst newspaper librarians. Libraries are not so much a place of last resort as a place of special resort – they are part of a complex spider web of information resources and systems. Over the last five years newspapers libraries have largely held their own. That is in marked contrast to the run-down of libraries in broadcasting. End use of online hosts did not turn out to be the threat first thought – indeed it has proved a boon, enabling libraries to provide information within the users' demanding time constraints; but the impact of a further round of end use through the Internet is as yet unknown. At *The Guardian* librarians see the Internet as a further opportunity to extend their global information reach into the world of grey and informal information. The main problem for them in the future might be that a familiarity with the Internet will provide senior management with an opportunity to intervene in wider online issues, like which hosts the library should subscribe to.

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Aslib
PROCEEDINGS

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Editorial

In this issue we offer a paper that is in danger of falling in to its own trap. David Bawden explores the nature of prediction, and illustrates his thesis with examples of predictions that have proved ludicrously wrong. The prediction business is one fraught with dangers for the unwary, who almost always fail to see either the extent or rapidity of change, even as it evolves. The more sanguine and prudent prophets, whether of millennial events or of technical change, tend to set dates for the fulfilment of their prophecies that lie well outside their own lifetimes. If you are going to be ridiculed then it is perhaps more acceptable that it should happen when you are no longer there to suffer it. Douglas Adams had a neat solution to the problem for his caste of philosophers who were appalled at the prospect of losing their livelihoods once the computer Deep Thought answered the ultimate question of life, the universe, and everything. It was pointed out to the philosophers that constructing the computer would take many years; they would be dead before it was completed; and in the meantime they could 'clean up in the prediction business' by speculating on what the answer would be. Far better then to be a commentator on the coming scene than to risk humiliation by trying to forecast it.

David's paper is based in the vision that started with Arthur C. Clarke's *2001: A Space Odyssey.* When I first read the book, closely followed by the reading of *2010...* and then *2061...* much of the story was in the category of believable, but yet to come to pass. Now *3100: the ultimate odyssey* has been published. Those readers who have read it are not invited to share the denouement with those, like me, who still have it waiting its turn in the queue. Clarke has an amazing record of prediction based on solid science, and on a deep understanding of the essentially messy nature of human behaviour. His worlds have never been sterile technocracies, but have instead contained a more believable mixture of leading-edge technologies having to exist within a context of their predecessor technologies and the thought patterns that created and supported them.

Every IT visionary who propounds a future that seems like a gigantic version of the Web, available to and used by all at a common level, just does not understand reality. That is, of course, why so many predictions seem so ridiculous in retrospect. They have been built on assumptions about human nature and economic systems that simply defy everything that we know from experience and history.

In a recent consultancy offered, there was a requirement that the work done should serve to make the contracting organisation 'future proof'. If the phrase means anything, then it means ensuring that resources are not deployed in such a way that they become trapped in a technical dead-end. A library management system that could not communicate with any other system, that generated files that could not be exported to other systems and were unreadable by other software, would be such a dead end. Looked at in those terms almost any system today would seem to be future-proofed. Furthermore, predicting the future in terms of library management systems is not as simplistic as suggesting that networks will become more complex, memory and processors cheaper and faster, and workstations more widespread. Those are not predictions but extrapolations, and no special insight is required to imagine them.

The danger lurks in the more difficult area of trying to spot transient fashions and fads that are disguised as trends. The present rush to make every system in sight look like a Web browser is a perfect example. If you go to any IT-based exhibition this year, the thing that will be most notable will be the bland uniformity of most of the products available, at least as far as their appearance on screen is concerned. This has little to do with functionality, and everything to do with 'me-too'ism. Against marketing plans there is nothing that future-proofing can do to protect the consumer.

Formula 1 motor racing is rife with copy-cat technologies. Some years ago the Lotus team attached black boxes to the air intakes of their cars. The team took elaborate precautions to ensure that the other teams would find it difficult, but not impossible, to get a look at the boxes. Soon every Formula 1 car in the field sprouted a similar box. They all did different things. The real difference was that the Lotus boxes were empty, void, and without function except as a technical tease to the other teams.

When Windows and the Web are burned out, what will the image-makers conceive next?

Peter Gillman
Editor

The nature of prediction and the information future: Arthur C. Clarke's Odyssey vision

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Based on a paper presented at a meeting of the Association of Information Officers in the Pharmaceutical Industry, London, 16 January 1997.

Abstract

Looking beyond the immediate future, which for the world of information and computing means the next five years, is hazardous. This paper attempts to present a vision of some aspects of the information world of the medium future. 2010 has been chosen as the date, rather than 2001, since the likely events of the earlier date can be fairly well predicted.

This paper is based on the ideas propounded by Arthur C. Clarke in the 'Odyssey' series of books and films, concentrating on the information and computing aspects[1-4]. Clarke, though perhaps best known for his fiction, has made significant contributions to thinking on information transfer, pioneering the concept of the communication satellite in geostationary orbit[5], its use to form a network of 'electronic tutors' in a global knowledge network[6] and the idea of the 'comsole', the ideal communications console, whereby one could have face-to-face interaction with anyone, anywhere on earth, and send or receive any type of information; the comsole could bring forth information at the speed of light from the great libraries of the world, and would also be a sophisticated robot secretary and have advanced voice recognition capability[7]. The Odyssey concept has been used, informally, as a vision for the future of information provision, for example in healthcare information provision[8] and in public librarianship[9].

In information terms, clearly the central image of the Odyssey series is the HAL 9000 computer. The combination of imagination with detailed analysis of scientific plausibility has given this fictional corpus much more credibility as a basis for serious comment than more recent fictions; see, for example, Midbon's study[10]. HAL, at a distance of thirty years from his conception, has proved to be sufficiently grounded in realism as to be regarded by many researchers as providing a valid 'image of potential' for information processing, and a touchstone for the progress of computer science. A recent book, edited by David Stork[11], presents the views of thirteen distinguished scholars on the ways in which HAL has influenced computing research in the nearly forty years since the appearance of the film, and the extent to which present day computers can, or will soon, attain HAL's capabilities. It is a fascinating juxtaposition of elaborate analysis of the film screenplay (based on a thirty second sequence, with seven lines of dialogue, Murray Campbell analyses how HAL's chess-playing algorithms must work, and through that what kind of intelligence he exhibits) with solid technical detail. The range of the book, and of the vision of Clarke and Kubrick, is remarkable: the design of super-computers; whether a computer can be made incapable of error; speech synthesis and recognition, and the understanding of language; machine vision, lipreading and the recognition of human emotions from facial expression; the ability of computers to plan and to use common sense; and computer emotions and ethics.

HAL, in this respect, appears somewhat analogous to Vannevar Bush's Memex concept of the 1940s[12], which in many ways foreshadowed the World Wide Web, and which stimulated much research into advanced information processing, providing both vision of progress and symbol of functionality, during the following three decades[13]. The Odyssey vision is clearly a rich source of ideas for thinking about the future of information.

The nature of prediction

First, it is worth looking at the nature of prediction itself, following Clarke's writings on the topic[14].

Failures of prediction are common; indeed they seem to be the general rule. Examples (largely taken from Clarke) include:

> *[These ideas are] good enough for our trans-atlantic friends... but unworthy of the attention of practical or scientific men.* [Parliamentary committee reporting on the applicability of Edison's electric light, 1878]

> *The abandonment of the horse as a means of locomotion, whilst creating a revolution in our social life, must of necessity lead to the ruin of both agriculture and commercial horticulture...*

if... the manure supply, hitherto an absolute essential to gardening, should come to an end.

Expensive motors are just now the rage among the wealthy classes, but when the novelty of the fad wears off... there may be a perceptible lull in their dangerous use, followed by a general return to the by far safer and more dignified equipment of a handsome carriage and pair. [Alexander Dean, gardening journalist, and William Miller, Head Gardener of Coombe Abbey, *Gardeners Chronicle*, 1904]

The popular mind often pictures gigantic flying machines speeding across the Atlantic and carrying innumerable passengers in a way analogous to our modern steamships... It seems safe to say that such ideas must be wholly visionary, and even if a machine could get across with one or two passengers, the expense would be prohibitive to any but the capitalist who could own his own yacht. [Astronomer William H. Pickering, 1912]

Space travel is utter bilge [The Astronomer Royal, 1956]

To show that visionaries in one field may be as fallible as anyone else in another, consider the advice of the Memex visionary, Vannevar Bush, to a US Senate committee in 1945:

[There has been talk about] a rocket shot from one continent to another, carrying an atomic bomb and so directed as to be a precise weapon which would land exactly on a specified target, such as a city. I say, technically, I don't think anyone in the world knows how to do such a thing, and I feel confident that it will not be done for a very long period of time to come.

In the information and communication areas such failures of prediction seem particularly prevalent:

What need have we of this invention? We have plenty of small boys to run messages. [Chief Engineer of the Post Office, of the newly developed telephone, 1876]

It is likely that every town will wish to have one. [Postmaster General, again of the telephone, a decade later]

When all is said and done the telephone is not an affair of the millions. It is a convenience for the well-to-do and a trade appliance for persons who can well afford to pay for it .[*Times* leader, 1902]

I think there is a world market for maybe five computers. [Thomas Watson, chairman of IBM, 1943]

Computers in the future may weigh no more than one and a half tons. [article in *Popular Mechanics*, 1949]

and so on.

Why are we so bad at forecasting? Clarke gives two reasons: the *failure of nerve*, when all the relevant facts are known, and the technology available, but we fail to grasp the consequence; and the *failure of imagination*, when we too readily dismiss the currently unattainable as permanently impossible. In either case, 'all attempts to predict the future in any detail appear ludicrous within a few years'[14].

Yet prediction, even very long term prediction, may be startlingly accurate:

Instruments may be made by which the largest ships, with only one man guiding them, will be carried with greater velocity than if they were full of sailors. Chariots may be constructed that will move with incredible rapidity without the help of animals. Instruments of flying may be formed in which a man, sitting at his ease may beat the air with his artificial wings... as also machines which will enable men to walk at the bottom the sea. [Friar Roger Bacon, 13th century]

It seems that long-range predictions, if they are to have any validity, must take the form of visions rather than sober forecasts, using the imagination rather than close logical analysis. [It is interesting to note that Clarke regards his work on 2001 and its successors as 'visions of the future' rather than forecasts or predictions, and that the literary critic Peter Brigg regards this part of Clarke's output as essentially mystical[15]].

Considering these factors, Clarke proposed his 'First Law':

Whenever a distinguished expert pronounces that something, within their field of expertise, is possible, they are almost certainly right. When they pronounce it impossible, they are almost certainly wrong. [paraphrase of a number of formulations]

This implies that whatever can be formulated as a technical proposition, provided that it does not conflict with laws of physics or the rules of logic, will be done, provided it is wanted badly enough.

For our purposes, this means that we should simply accept the practicality, perhaps the inevitability (though not necessarily the desirability) of obtaining access to all information in a simple and rapid manner, through intuitive, largely graphical, environments. All information will be digital, and may be stored locally in as great a quantity as required, and transmitted to any location essentially instantaneously.

That this is not unrealistic is shown by well-established trends, such as Moore's Law: the number of elements in advanced integrated circuits (and hence, in a rough manner, computing power) doubles every year. The speed of advance in information processing is illustrated by the well-known analogy with the motor industry: if advances in this industry had been as rapid as in IT since 1945, then by now a Rolls Royce would cost about 10p, would travel several million miles without refuelling, and, should more space be necessary, would have an engine shrinkable to the point where fifty would fit on a pin-head.

It may reasonably be objected that these trends describe raw computer power, and data storage and transmission, and not more subtle aspects of information and knowledge management. However it is these broad technical capabilities which will shape the future information world. We must qualify the vision by considering many detailed aspects and criteria; here we will choose four important ones, all touched on in the Odyssey vision.

A digital world?

> *There were no books, and not even paper and pencil on his desk. All the volumes in all the libraries in the world were instantly available at the touch of [his] fingers, and the visual display was his sketchbook and writing pad.*[2]

We may have the possibility of putting all knowledge and all media into digital form, accessing and displaying it in consistent ways, and working in a completely digital environment. But is this desirable? What are the problems to be faced? The preservation of information, when archiving digital material may also imply archiving the obsolescent machinery to read it, is likely to be one such; so is providing the means for serendipitous and creative information access. We know very little about what operations in a truly digital environment would be like. Print on paper remains a favoured option for many.

Filtering

> *At least there was a sporting chance that what he was looking for was hidden somewhere in the immense body of existing scientific knowledge. Slowly and carefully, [he] set up an automatic search programme, designed for what it would exclude as much as what it would embrace. It should cut out all Earth-related references – they would certainly number in the millions – and concentrate entirely on extraterrestrial citations.*[3]
>
> *...Intelligence was frequently wrong, and even more often confused by the avalanche of raw facts it had to evaluate... when you did not know what you were looking for, something that at first sight seemed irrelevant, or even nonsensical, might turn out to be a vital clue.*[2]

The prospect of having essentially all information available in digital form, rapidly accessibly from the desktop by a consistent interface, may seem an information worker's dream. In fact, it will rapidly turn into a nightmare, if systems and procedures are not quickly developed for filtering, prioritising, discarding and forgetting information, as well as for extracting nuggets from the pile: data mining, visualisation, etc.[16, 17] Philosophically, this may go against many of the 'traditional' values of the library/information professions, which have tended to emphasise acquiring, preserving and accessing 'all relevant material'.

Information overload, which in essence is what is being described here, is by no means a newly recognised phenomenon, being addressed over 25 years ago[18]. However, it is receiving urgent attention as the amount of information, particularly in digital form, increases, with emphasis on the narrowing and focusing of retrieval[19], and on adding value in the provision of refined and reduced 'quality' information[20].

Intelligent agents

> 'Open the Pod Bay door, Hal'
> *'I'm sorry, Dave – I can't do that'*
> [2001: A Space Odyssey, film screenplay]
>
> 'I want to do this myself, Hal,' he said. 'Please give me control.'
> *'Look, Dave, you've got a lot of things to do. I suggest you leave this to me... Why don't you take a stress pill and get some rest.'* [1]

Intelligent agents are currently very limited in scope. Most lines of research into artificial intelligence suggest that the development of small and specialised agents, for one particular task, is most likely to be fruitful in the short-term. Research is currently providing design principles for intelligent agents to be used, for example, for 'reference library' style querying[21]. General purpose machine intelligence, such as displayed by HAL, seems a long way off, not least because of the difficulties of imparting 'common sense' knowledge, rather than specialised technical information, to such machines, as shown by the heroic efforts of Douglas Lenat's team on the CYC project[22]. However, given that one major task for such agents will be the filtering and discarding of much information, we must decide just how much control we, as individuals and as organisations, want to pass over to our agents. Will we really trust them to discard 'relevant' material without our seeing it?

Or will the real problem be stopping them forcing it to our attention, as is already happening with some Internet filtering systems:

> *...for content providers there [are] several ways of making Web content easier to find and arrange for users, most notably continuing to deliver content even when users aren't browsing... but I wonder if users will be happy to have the same confusing streams of information that they can go out and search for delivered to the desktop. If my experience with e-mail teasers for online services is anything to go by, the answer is no... Not surprising when you consider that this is analogous to having a TV set that switches itself on and pushes you into your chair when programmes you've previously expressed an interest in come on.*[23]

Paying the bill

> *One of the benefits of [his] eminence was an unlimited computer budget: that was part of the*

> *fee he demanded from the various organisations who needed his wisdom. Though this search might be expensive, he did not have to worry about the bill.*[3]

While it may be true to say that essentially unlimited information access is feasible, someone will have to pay for it. There are many unresolved, indeed unaddressed, issues of access to information: how to conduct commercial transactions over the Internet; how to handle the economics of publishing in a digital environment; how to balance the need for fair protection of intellectual property with reasonable rights of access; 'browsing rights', in the context of the recent discussions at the World Intellectual Property Organisation; how to minimise the dangers of a polarised 'information rich: information poor' culture, especially in light of the evidence of falling literacy in the Western world. Liedes[24] and Zelinski[25] provide overviews of some of these issues.

We might ask whether this matters, with the increasing multimedia capability of computers; but the amount and nature of information and knowledge which can be transmitted by graphics or voice synthesised 'sound bites' are limited. Access to knowledge, for that bulk of the world's population which has neither the means, nor the skills, to use sophisticated tools, may become much more restricted. This points up the dark side of the Odyssey vision.

Conclusions

Sober extrapolation of trends tells us little about the information world beyond the near term. Visions, such as 'Odyssey', are more helpful. We look forward to a digital world, with the promise of an ideal information environment, in as much as technical issues of digitisation, storage and transmission are essentially solved, and their solution taken for granted. Other issues, arguably those which always have been, and should continue to be the main concerns of the information professions, remain.

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Seed science literature on Nigeria, India, Australia, United Kingdom and United States: a comparative study of author collaboration

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Abstract

The study compares author collaboration in the periodical literature of seed science on Nigeria, India, Australia, United Kingdom, United States of America. The study was based on the literature of seed abstracted in the 1993-1995 issues of Seed Abstracts. *However, it was found that both the annual rates as well as the accumulation rates for the period of each of the five countries studied was generally high, although the figures obtained for the United States of America and the United Kingdom were higher than those of Australia, India and Nigeria. The study concludes that the literature of seed science is dominated by multi-authored papers and that there is a trend towards collaboration in the countries studied.*

Introduction

Bibliometrics is the application of statistical analysis to the selected and studied literature of a given subject. Various techniques of bibliometrics are applied to different situations to analyse and come out with useful findings. Authorship is one of the techniques that are applied in knowing a subject literature. Authors who contribute to a subject field usually constitute a population. Within this population many patterns may emerge, such as single and multiple authorship.

Author collaboration is rightly observed (Afolabi[1]), is the act whereby two or more authors jointly produce a publication. Also Subramanyan[2] states that scientific research is becoming an increasingly collaborative endeavour, and added that the nature and magnitude of collaboration vary from one discipline to another and depend upon such factors as the nature of the research problem, the research environment and demographic factors.

In many subject areas author collaboration has been studied, for example the humanities, social sciences and natural sciences. One subject in which little is known about its author collaboration is seed science. This study therefore is focused towards determining the pattern of authorship as it relates to author collaboration in the literature of seed science on Nigeria, India, Australia, the United Kingdom and the United States. This study will answer the following questions: does author collaboration exist in the literature of seed science on Nigeria, India, Australia, the United Kingdom, the United States? If it exists, what is the extent for each of the countries studied? Do author collaborators vary from one country to another? Many studies of author collaboration were conducted by different people in different subject areas. Price and Beaver[3] found that the most productive member was by far the most collaborative in the literature of oxidative phosphorylation and terminal electron transport. Also Hirsch and Singleton[4] showed that the amount of multiple authorship in a subject field is closely related to the amount of financial support. Price[5] reported the incidence of collaboration among biomedical writers. Pao[7] who studied authorship patterns in computational musicology from 1949 to 1975 concluded that 'even though a small number of authors had co-authored, the heavy collaborators were also the most prolific in the field'. Shaw[8] also observed that co-authorship establishes a relation among authors which is a measure of the extent to which they communicate directly and that the strength of the relationship between any two authors may be computed by counting the number of papers they produce jointly. Also Weintraub[9] provided a theoretical generalisation that whereas the scientist collaborates, the humanist rarely collaborates. Subramanyam[10] identified six types of author collaboration: teacher pupil collaboration, collaboration among colleagues, supervisor-assistant collaboration, researcher consultant collaboration, collaboration between organisations and international collaboration and also observed that the degree of collaboration varies from one discipline to another. He proceeded by saying that collaboration is generally high in the scientific and technical fields, but low in the humanities. Furthermore, he introduced a method for measuring author collaboration. Lawani[11] also defined the term collaboration index to describe the average number of authors per paper at a given set of papers and used it as a quantitative measure for collaboration. He also found that the greater the collaboration index of a set of papers, the higher is

	Nigeria			India			Australia			United Kingdom			United States		
Number of articles abstracted in Seed Abstracts	1993	1994	1995	1993	1994	1995	1993	1994	1995	1993	1994	1995	1993	1994	1995
	30	22	24	701	614	499	137	145	147	196	208	219	688	587	706
Total	76			1814			429			623			1981		
Number of author collaboration articles	20	16	19	611	528	438	91	94	114	137	161	167	520	447	573
Total	55			1577			299			465			1540		
Extent of author collaboration (C)	2.1	2.4	2.1	1.8	2.53	2.53	1.97	2.43	2.44	2.55	2.58	2.7	2.55	3.18	2.64
Average for three years	[2.2]			[2.28]			[2.28]			[2.61]			[2.79]		

Table 1. Extent of author collaboration in seed science literature on Nigeria, India, Australia, United Kingdom and the United States.

the proportion of quality papers in the set, and that collaborative index can be used to measure quality in aggregate. He found three factors that affect the relationship between collaboration and quality. These are: individual abilities of team members, size of the team, and cohesiveness of the team. Afolabi[12] found that the author collaboration pattern of library and information science literature could be described as having the characteristic of a humanities subject with little collaboration.

Methodology

The data collected for this study were gathered from *Seed Abstracts* for the years 1993 to 1995. Periodical articles, conference papers, reports and occasional papers abstracted in *Seed Abstracts* are included. On this basis, the data for the five countries were gathered and analysed.

For Nigeria, a total of 76 papers were counted, and out of this figure 55 papers were produced by collaborating authors. A total of 1,814 papers was counted for India, and out of this figure 1,577 were produced by co-authors. From the total of 429 papers recorded for Australia, 299 were produced through collaborative effort. For the United Kingdom, a total of 623 papers was counted, and from this figure 465 were produced by co-authors. A total of 1,981 papers was counted for the United States of America; 1,540 papers were produced by collaborated authors. The methodology used to arrive at these figures was that the data on authorship from these five countries were sorted to reveal the number of papers with one author, two authors, three authors, four authors, etc. The number of authors per paper was used as a measure of the extent of collaboration in producing the papers. The weighted average method was used. This method is considered valid and has been used in a number of previous studies.

Findings

From Table 1, it can be seen that the United States of America was the most productive country out of the five, with a total number of 1,981 papers, followed by India with 1,814 papers, the United Kingdom with 623 papers, then Australia with 429 papers, and lastly Nigeria, with 76 papers.

Out of 1,981 papers recorded for the United States of America, 1,540 were produced on a collaborative basis, thus representing 77.7 per cent.

Also from 1,814 papers recorded for India, 1,577 papers were produced on collaborative bases, representing 86.9 per cent. Of the 623 papers recorded for the United Kingdom, 465, or 74.6 per cent were recorded as collaborated papers. Of the 429 papers recorded for Australia, 299 or 69.7 per cent of papers were recorded as collaborated papers, while 55 or 72.4 per cent of papers from a total of 76 for Nigeria were produced on a collaborative basis.

As indicated in Table 1, the extent of author collaboration is higher in the United States of America (2.79) and the United Kingdom (2.61) than in Australia (2.28), India (2.28) and Nigeria (2.2) for the three years studied.

From Table 1, the value obtained for each of the three years shows that there is a trend towards author collaboration in the literature of seed science from the five countries studied.

Discussion

The degree of author collaboration among authors of Nigeria, India, Australia, the United Kingdom and the United States in the literature of seed science is very high, as indicated by the value of collaboration (C) which is not less than 2.2 in all these countries studied.

This high rate of collaboration is a clear indication that all five countries have a high number of invisible colleges, colleagues, and solidarity groups that collaborate to write papers in seed science literature. This supports the opinion that in natural and applied sciences two or more people tend to collaborate and write papers.

Weintraub's study made a theoretical kind of generalisation that whereas the scientists collaborate, the humanists rarely collaborate. Lawani's finding in his study on the literature of cancer exhibited that there is high author collaboration in a scientific subject such as cancer where the extent of collaboration for the average-order quality articles was computed as 2.90. Subramanyam quoted D. Lindsey and G.W. Brown in an unpublished study which found that collaborated papers accounted for only 17-25 per cent in the social sciences and humanities; but in the natural sciences multi-authored papers constituted 47-81 per cent of the samples.

Conclusion

In conclusion, the findings of this study clearly show that the degree of author collaboration in the literature of seed science in Nigeria, India, Australia, the United Kingdom and the United States of America is generally high. Therefore, it can be said that the literature of seed science in the five countries is dominated by multi-authored papers and that there is a trend towards collaboration among authors of the five countries studied.

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Knowing your customers

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Abstract

Have library managers been sufficiently aggressive in identifying and understanding their customers, given that the future of individual services and the profession as a whole rest to a large extent on customer perceptions? What do library managers need to know about their customers? This article examines some of the key concepts concerned with customers and consumer buying behaviour. It starts by seeking to explore the concept of customer for library and information services, and notes the roles of users, influencers and deciders. Many library and information services deal with 'internal customers'. In order to offer an effective service to customers, it is important to identify the benefits sought by different groups or segments, and to understand the consumer decision-making process which is important in determining 'purchase' behaviour and the use of the service.

Introduction

Have library managers been sufficiently aggressive in identifying and understanding their customers, given that the future of individual services and the profession as a whole rest to a large extent on customer perceptions? What do we know about our customers – have we thought about what makes them use a library service in the first place, and later, what factors ensure customer retention? Do library managers think not just in terms of which services customers use, but more fundamentally in terms of the benefits that customers seek from a library service? How do customers judge quality of service? The recent introduction of loyalty cards in the retail sector represents the first real attempt by retailers systematically to collect data on their customers. Previously, retailers often had accurate data through their point-of-sale terminals about sales of specific product lines which informed inventory control and the identification of successful products, but apart from the information collected through occasional market research surveys, retailers had only limited profiles of who their customers were, how the profile of those customers changed with changing seasons or product lines, or what influenced their buying behaviour. Library managers have for a long time had user cards and have collected information about transactions, which has potential for being analysed to create customer profiles. Is such information being analysed and used with a view to acquiring a better understanding of customers? What do library managers need to know about their customers? This article examines some of the key concepts concerned with customers and consumer buying behaviour.

Who are the customers?

The first stage in seeking to know more about customers is to start to understand the role of a customer. The concept of a customer for library and information services can be complex. In a 'standard' purchasing transaction, the customer is the person who pays for the product and in exchange receives the product, and thereby participates in the marketing exchange. The situation is often more complex than this, and the following roles often exist, and may be taken by various agents in the customer transaction:

- **users**, who actually use the product or service;
- **influencers**, particularly those with previous experience of the service;
- **deciders**, the actual decision makers in the use/purchase decision, such as parents for children or children for parents(!).

Another useful distinction is that between customer and consumer. **Customers** can be used to refer to any stakeholders, individuals or groups for whom the organisation in some way provides a good or service. **Consumers** are the users of the service.

Many libraries are part of the public sector. Here, the complexity of the concept of customer requires specific attention. The public sector has a number of stakeholders, all of whom have a different experience of the individual public sector service or the cumulative effect of public sector services, such as education or the health service. Stakeholders include: consumers, their parents and families, the local community, society, the government, the governing body, executive boards, staff, local authorities, and current and potential employers. These stakeholders all have different roles in service definition, the evaluation of service quality and participation in the service experience. For example, in education all of these stakeholders are concerned with the 'end product'. They are concerned to varying extents with the process associated with the creation of the product. Employers and society in general are concerned primarily with the 'product' of the system, whereas students and arguably their families will also be concerned with the process.

In addition, many public services are engaged in offering services to other public services, and the concept of **internal customer** is important here. For example, academic libraries offer services to students and staff. In the case of students, libraries offer a component of the total service experience that a student undergoes in a further or higher education institution. In relation to academic staff, these staff are internal customers. The quality of the library service that they receive will indirectly affect their delivery to the students, both in terms of the knowledge that may be imparted, but also in the sense that the efficient delivery of library services will impact upon their work patterns and loading and, accordingly, the time that they have to devote to students. The provision of a service to internal customers is, then, often central to efficient and effective operations within the organisation, and accordingly external customer service.

Customers and benefits and segmentation

Customers seek benefits or solutions, not products. It is important therefore that any product or service created offers the benefit that customers seek. Often, when customers buy a product, whether it be a good or a service, they buy a cluster of product features, but may only want one or two of these features. What benefits do customers seek from a library service? Ready and convenient access to information, a good stock of recent books for loan, a reliable reservations service, a friendly personal service, lively and engaging entertainment?

Generally, customers are seen as members of a market. Normally undifferentiated marketing into a general market is unsuccessful, although it is incumbent upon public sector services such as public libraries to communicate in some way with their entire client group, or the general public. Usually, some kind of segmentation is introduced as an aid to gaining a better understanding of customers and the benefits that customers seek. **Market segmentation**, then, is important in understanding customers. Market segmentation is the process by which customers can be grouped into smaller, more similar segments to achieve a sufficient group size to be able to offer a standard marketing mix.

There are a range of different segmentation variables, or ways to segment markets. Demographic variables such as age, sex, occupation and social class have traditionally been used for market segmentation. These have been popular, not because they are necessarily the best segmentation variables, but rather because the data on these variables are relatively readily available. Good segmentation relates to customer needs, and should be informed by the factors that influence the consumer purchasing process.

Figure 1 shows some of the traditional segments that might used by library an information services. Do these segments relate to the benefits sought by customers?

SEGMENTS	EXAMPLES
General Public	Adults Children Special groups e.g. the housebound, or the blind
Professional groups Academic users	Children Adults – Students Adults – Staff
Business users	Scientists Marketers Managers
Intermediaries	Within organisations Information brokers

Figure 1. Some possible market segments for library and information services.

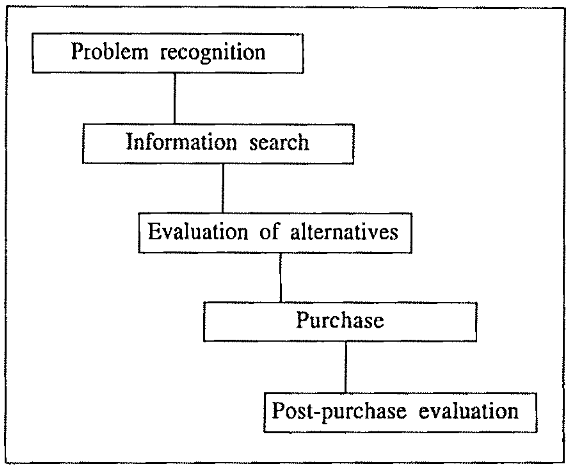

Figure 2. The consumer decision making process.

Once an organisation has identified appropriate market segments, it needs to identify those segments for which it will seek to provide a product or service. This process is known as targeting. Which of the segments in Figure 1 are appropriate for your particular client group and service?

The consumer buying process

A focus on the consumer buying process offers two useful perspectives: the decision-making process associated with consumer buying and the factors that affect the buying process. Together, they emphasise that although customer benefits must be at the core of any marketing strategy, unless the customer can be convinced of the value of those benefits, and continues to identify with the benefits that a specific service or product offers, purchase or use of the service will not happen, nor be repeated.

One model of the consumer decision-making process involves the following stages:

- problem recognition, or the identification of need.
- information search, including internal search covering the consumers' own previous experience, and external search covering information gathering from

friends, colleagues and other public sources, such as consumer groups.
- evaluation of alternatives, against criteria, taking into account the levels of importance of the various criteria.
- purchase, on the basis of the criteria, but also influenced by other random factors as discussed below. The seller from whom the purchase will be made is not selected until this stage.
- post-purchase evaluation, including whether the customer is satisfied with his or her purchase. During this phase, cognitive dissonance, or the feeling that the purchaser has not made the correct or best decision may arise.

It may be that this process is rather too complex to use in relation to each 'purchase' or visit to a library, where the consumer behaviour may more closely reflect routine response behaviour. Nevertheless, each of the stages may be applicable at some stage in the consumer decision process. In encouraging new customers for, say, a new business information service, or an Internet club, all of these stages may be relevant. Certainly the library needs to consider the nature of their relationship with customers through each of these stages, including, as appropriate, elements of the customers' experience of the service and promotional activities.

Customer retention and loyalty

When customers have participated in the service experience once or acquired a specific product, all service suppliers and producers will be concerned to retain them as customers. A loyal customer base provides security, in the context of a profit-orientated organisation, for future revenue; and, in the context of a public sector organisation, a valued public service. There are four categories of customer in terms of loyalty:

- hard core loyals, who are consistently loyal to a product, or producer;
- soft core loyals, who are loyal to two to three products or producers;
- shifting loyals, who move between products and producers;
- switchers, with no loyalty to any specific product or producer.

A recognition that these categories exist in any customer group should impact upon the types of library service offered, the resources allocated to specific services and the use of promotional activities. Libraries can assume that they will retain the hard core loyals, provided nothing challenges this loyalty; soft core loyals and shifting loyals will continue to use a specific library provided that it meets their leisure or educational needs at least as well as do one or two of the competitors. Switchers may take advantage of special facilities, such as a children's summer scheme, but are unlikely to exhibit any continuing loyalty.

Loyalty derives to a significant extent from the satisfaction with the initial good or service experience, and the extent to which the service supplier succeeds in maintaining customer satisfaction. Customer satisfaction with a service is closely liked with perceptions of service quality.

Usage rate is also related to loyalty. In terms of usage, customers may be categorised by status, and usage rate. Examples of usage status are: non-users, ex-users, potential users, first time users and regular users. Usage rate may be heavy, medium, or light.

Conclusions

An understanding of the customer and the benefits he or she seeks from a library and information service is central to survival. Customers seek benefits, not products or services. An analysis of customers in terms of benefits can inform effective segmentation, which in turn can lead to more efficient targeting of resources. The consumer decision making process is important in determining 'purchase' behaviour and the use of the service. Library and information services need to be aware of the different stages in the consumer buying process. Once an initial transaction has taken place, managers need to ensure service delivery that leads to customer retention. It is important to analyse critically the relationship between the library and its consumer.

The development of an intranet within a college of further and higher education

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Paper presented at the Aslib conference on 'Evaluating the Intranet as part of your knowledge management strategy', 26th and 27th September 1996.

Abstract

This paper outlines the origin and continuing development of an intranet within Wirral Metropolitan College. The College intranet has grown as a result of a number of initiatives introduced which have been designed to improve student and staff access to Internet-based and in-house generated learning resources.

Introduction

Many definitions have been given to the term 'intranet' and they have changed accordingly to suit the marketing strategies and products of the software houses who have benefited from this recent materialisation of a highly profitable sideline in Internet technologies.

The definition of an intranet adopted in the context of this paper is simply that of 'exploiting Internet technologies within an organisational-based computer environment to aid the progression towards the seamless navigation of both Internet-based and in-house generated learning materials'.

Wirral Metropolitan College reputedly has one of the largest Further Education computer networks in Europe, with over 1,800 networked workstations spread across 150 locations, offering access to the latest industry-standard multimedia software and an unparalleled electronic learning environment.

College users may also access the Internet and the resources of the rapidly expanding intranet from any one of these workstations. The College currently provides up to 50 concurrent connections to the Internet and unlimited user access to intranet resources. Access to the Internet is via a 2 mbps microwave relay link to SuperJANET.

The workstations run *Windows* on a Novell network across four main campuses via Megastream links. Internet access from the College network is through a NOVIX firewall and gateway which converts the IPX/SPX protocol to Internet Protocol (IP).

The origin of the college intranet

In recognition of the dramatic increase in demand for these resources, it was realised at an early stage that a team was needed to co-ordinate the provision of these resources. As a result, a five-member team was formed. This team became known as the Internet Access Group. The aim of the group is to improve continuously the exploitation of Internet resources and related technologies as a learning and teaching resource. This exploitation has been sought through monitoring and addressing issues such as:

- user behaviour and interests whilst online
- comments and requests made by students and staff
- continuously review new and improved Internet/intranet technologies
- abuse of the provision and related disciplinary issues
- staff and student education and learner support

In monitoring the above, an understanding was gained of the unique problems and opportunities associated with the Internet and its technologies. Using this information, initiatives have been adopted with the aim of meeting the following broad objectives:

1. to source curriculum-relevant Internet-based information, and direct the students and staff to these sources by developing a quality filter/interface to the Internet
2. to exploit Internet technologies to aid more effective delivery of learning materials
3. to target relevant Internet-based material for 'mirroring' (copying) on the College network to improve speed and ease of access to learning materials
4. to help save financial resources for both the Library Services and IT Department by targeting less costly or freely available Internet-based information as opposed to print or CD-ROM format
5. to integrate a web server with the internal network so that staff, students, subscribing commercial enterprises and potential customers may access College resources via external networks
6. to initiate educational programmes for staff and students through regular tutorial support and staff Internet awareness courses.

The College intranet has subsequently materialised through initiating measures to achieve these objectives and through the use of two core Internet technologies – electronic mail and the Web browser.

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The technology

E-mail

The use of e-mail had become the *de facto* method of internal communication across the College's campuses long before a gateway via JANET was established. Staff and students are able to send messages to both individuals and groups with only basic initial instruction needed. E-mail may be accompanied by any number of file attachments and is frequently used for the purpose of sending timely information. Examples of the many uses this additional facility provides include the sending of memos, student course work, corporate related documentation, in a variety of file formats.

In addition to the two-way communication available between staff and students alike, the system facilitates the use of electronic 'bulletin boards'. The bulletin boards enable staff and students effectively to convey information across the College, or to pose queries to relevant qualified staff.

Examples include bulletin boards for the inclusion of:

- general College notices;
- a forum for posing a wide range of curriculum and non-curriculum related queries to the staff of the Library Services;
- a forum for advising users on a wide range of issues relating to the use of College networked resources.

Staff and students may now seamlessly send and receive e-mail from their personal accounts through the Internet as easily as sending internal College e-mail.

The seamless combination of Internet and College-based information has been further enhanced by the inclusion of Internet-based mailing lists being mirrored alongside the College bulletin boards. This facility enables staff either to observe freely, or take part in, UK and global-wide discussions with members of other academic institutions.

This method of gaining access to Internet mailing lists has two main advantages over conventional methods of access:

1. It removes the need for staff to join the mailing lists individually and therefore removes the need to learn the system commands of the respective listserv systems which maintain the lists.
2. It results in more economical use of bandwidth as incoming e-mail from the mailing list is received only once rather than by hundreds of individual staff e-mail accounts.

These electronic mailing facilities have steadily evolved into a comprehensive and yet informal service for the dissemination of current awareness information from both internal and global sources.

Web browsers

The second and more rapidly developing area of the College intranet is through the adoption of those Internet technologies commonly associated with the World Wide Web (WWW), e.g. the Web browser, HyperText Transfer Protocol (HTTP) and HyperText Markup Language (HTML). This technology is used for accessing curriculum-related resources held both on the World Wide Web and the College network.

It was recognised at an early stage of providing College-wide access to the World Wide Web that there were huge resources of information of educational value available across the Internet. It was recognised equally at this early stage that access to these resources was extremely restricted by the sheer volume of information available and the exponential increase of commercial, personal and trivia-filled Web sites with little or no use as learning resources.

On gaining access, users found more problems in accessing relevant information through a lack of knowledge in the workings of the Internet. If the users managed to find their way to the search engines and managed to process a search, they were frequently confronted with a number of irrelevant 'hits' due to the diverse nature of the Internet and the non-qualitative indexing systems of the search engines.

Intranet as a quality filter and interface to the Internet

Subsequent initiatives in aiding the retrieval of curriculum-related resources formed the inconspicuous beginning of the College intranet. The system took the guise of a small number of in-house authored HTML pages held locally on the College network. These pages, known as the 'Internet Resources Pages', are menu structured lists of familiar subject headings and sub-headings. The pages appear by default upon the launching of the Web browser software and serve as a quality filter and 'live' interface to relevant sites of educational value on the Internet.

These sites are discovered by scanning various printed and electronic sources such as: computer journals and press publications; subscriptions to newsletters of professional information bodies, e.g. Institute of Information Scientists and the Library Association, regular electronic updates from numerous Library & Information Service mailing lists and interrogating the established search engines of the Internet. Staff and students are also invited to submit suggestions of sites which they feel should be listed within the subject index and/or those they feel warrant being mirrored on the College network.

The 'Internet Subject Resources' pages aim to provide quick access to relevant sites through a number of contributing factors.

All resources listed in this subject index are deemed to be supplied by responsible organisations and individuals. Where possible, only UK-based resources are listed and are indicated as such. These pages have also become the natural pointer to those resources that have been 'mirrored' on the College intranet. This *should* result in quicker and more relevant material being received than those sources retrieved by the established search engines.

The methods which the search engines use to compile their datasets are becoming more complex and descriptive[1], but the successful delivery of relevant results to the enquirer is likely to become more tested as more trivia are pumped onto the WWW and the search engines continue to compete to index ever increasing numbers of WWW pages (irrespective of the quality of the site contents).

Using the Internet Resources Pages, new or novice users are more readily able to gain access to the WWW and the 'subject index' alleviates the need to understand HTTP protocols and removes the need to remember or re-type complicated Internet addresses.

Although the information resources are on the Internet, the lists and hypertext links to the Internet site are all held on the local College network. This means the available sites appear instantly when a selection is made from the list of subject headings. This is in contrast to the searching and retrieving of information from the conventional Internet search engines on the WWW (increasingly becoming known as the World Wide Wait) which may take several minutes to connect, or in cases of heavy traffic connections may not even be possible.

For the more experienced user, or for the need of a more diverse search strategy, provision is made for accessing the majority of popular search engines (such as *AltaVista, InfoSeek, Lycos* and *WebCrawler,* etc.) directly from dialog search boxes held on College-based files. Again, bandwidth and connect time is reduced by removing the need first to connect to the respective search engines before the user may submit his or her search query. This has been achieved by 'cutting and pasting' the source code from the respective search engine sites to the local intranet pages.

While the number of pages grew to accommodate the rapidly expanding number of new sites, it became clear that even more economical use of bandwidth could be made possible by targeting the more popular and relevant Internet-based material for 'mirroring' (copying) on the College network to improve speed and ease of access to learning materials. As mentioned previously, links to these sites are incorporated within the Internet Resources Page alongside links to the original Internet-based site.

Using inexpensive shareware for the purpose of mirroring, whole sites can be targeted for downloading and then deposited in a single dedicated local directory. Each hypertext URL within each individual page is then automatically edited to link to the respective pages in the local directory rather than its original location on the Internet.

The currency of the listed sites is maintained by a combination of both informal e-mail messages from staff and students reporting any out-dated links and monitored automatically by periodically running freeware which scans the lists to check that each link still makes a valid connection to its respective site on the Internet.

As systems were developed to allow users access to these mirrored sites, even when live Internet connections were not currently available, it was appreciated that here was a flexible medium that could deliver any number of information resources in a range of file formats from a single application with the additional advantage of using hypertext links as a navigational aid.

This structure is also now being adopted on the College Web server to extend the current remit of delivering corporate information to include improved access to learning materials.

This need has arisen from the increasing number of staff and students with PC and modem connections at home.

Intranet as an information system

The most significant opportunity offered by Internet technologies to the College is the use of the technology further to create a fully functional information system for accessing and retrieving both corporate and learning materials to complement the College's existing computerised learning environment.

Three primary examples for the increasing popularity of using Internet technologies for the basis of an information system are:

1. The appeal of the easy-to-use technology which provides the seamless navigation of information in the form of video, text, audio and graphic images. This factor is especially attractive due to the possibility of being able to access the information on networks external to the network as well as internal.
2. Only a single interface is needed to access all formats of information as opposed to the traditional number of dedicated interfaces needed to interrogate systems such as databanks, bibliographic information retrieval systems, and management information systems[2].
3. Considerable cost-savings may be gained by adopting web browser technology as the interface for the system. This is especially evident when a single user licence, Netscape *Navigator*, for example, is around $20 and alternative proprietary groupware may cost around $150-a-user[3].

This latter point is of particular interest to educational establishments such as Wirral Metropolitan College due to the fact that these licences are made available free of charge and with unlimited user privileges. In contrast, other web browsers, such as Microsoft's *Internet Explorer*, are available free of charge to both commercial and not-for-profit organisations[4].

All these benefits are in addition to those traditionally demanded from an effective information system. A brief list of these benefits in delivering organisational-wide information through the implementation of an intranet may include:

- fewer staff are needed for the management and delivery of documents[5].
- access to documents is guaranteed at any time, eg. documents are not lost or misfiled, or temporarily on loan to other staff.
- reduction of lead times to produce new material. Elements such as corporate logos, graphical backdrops, and corporate document formats may be incorporated into set style sheets for repeated use or the author may simply 'cut-and-paste' into the new or revised document.
- provides access to a variety of in-house generated information from any workstation within the organisation (and via external networks if access is made available and authorised).
- only one copy of the document needs to be maintained, as opposed to the circulation of many hard-copy documents across the organisation.
- with the maintenance of only one document needed, information always remains accurate and current, as opposed to the circulation of printed material which does not indicate whether it has been superseded or not.

As expected with the adoption of any alternative system which is radically different to what has gone before, the organisation is likely to approach cultural and operational obstacles that need to be overcome.

Such issues which may need to be addressed in the near future include:

- overcoming user resistance to change, and training in the use of a new system
- staff traditionally linked with the production and distribution of printed material will need to be retrained so that they may acquire the necessary skills needed in operating automated information management systems
- a creative balance will need to be struck between the information content of the intranet documents and the combinational use of graphics and display formats made available by frequently updated HTML standards. The use of HTML elements, such as frames, may look attractive and add a professional touch to the front end of corporate Web sites, but may needlessly detract from the actual information content contained within the intranet document
- the increase in the number of in-house HTML documents produced by information workers within the College will demand that their traditional role of evaluating software for information provision will increasingly concentrate on the contribution of both the graphical format and quality of information content[6].

Future developments

The intranet is still very much in its infancy, but the scope for its developing role as an integral part of the College's electronic learning environment is considerable.

As indicated earlier, the HTML hierarchical-structured menus (Internet Resources Pages) currently serve a dual purpose of acting as both quality filter to the Internet and an interface to locally held mirrored sites and in-house generated HTML-based learning materials. Unfortunately, these pages only provide links to HTML-based resources. If the intranet resources are to be further integrated with the extensive learning resources of the College Learning Environment, a facility is needed to allow the user to search and retrieve these resources via the Web browser interface.

The likeliest option to be adopted to meet this need would be the implementation of a Wide Area Information Server (WAIS) service based on the Z39.50 protocol. The Z39.50-1992 protocol is claimed to have become the nationally and internationally accepted new standard for networked information search and retrieval protocols[7]. Many free versions of this software are available, as well as many more sophisticated commercial variants which may be used across a number of standard network platforms[8].

The exponential growth of relevant qualitative resources on the Internet can only contribute to the saving of financial resources for both the Library Services and Computer Services by targeting less costly or freely available Internet-based information as opposed to print or CD-ROM resources. As the sources targeted are in the public domain and therefore free, the number of multiple accesses to the file available are only restricted by the limitations imposed by the network technology in use and not by the licensing restrictions imposed by the major software houses.

The intranet will further complement the College's current collaborative ventures with other regional Colleges to provide Internet access to 60 Small and Medium Enterprises (SMEs) based in the Merseyside area. An additional option is also available for full commercial access, which would allow the College to provide Internet subscription services and the provision of Web services. The flexibility of the intranet will readily provide the ideal platform for the delivery of commercial access to College educational programmes and facilitate teleworking for these local enterprises.

The College intranet is quickly being realised as a medium which allows a large number of the positive aspects of the Internet to be exploited and a vast number of the negative ones to be ignored. Regardless of whether Internet access becomes more readily available or bandwidth continues to become more congested, it is expected the adoption of internet technologies within the College network will improve access to teaching and learning resources and consequently enhance the learning experience of the user.

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Kevin Carey

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Mike Bonaventura

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Editorial

Disadvantage can come in many forms. In relation to information technology it can be because of a lack of the equipment, or the infrastructure to support it. Kevin Carey, in his paper on how visually impaired people (VIPs) are becoming increasingly disadvantaged by graphical user interfaces, demonstrates another view. View? For VIPs that is what they don't have, but most of the alternative metaphors that we might use also imply sight: perspective, viewpoint, outlook. 'Look and feel' has a rather different meaning if your access to screen displays is via a braille line-by-line readout. And what of a screen-based speech synthesiser trying to cope with overlaid windows? Other issues that Kevin has not touched on (but may do so in a further paper) concern the emphasis on IT for the VI as being for them to express themselves; not for the receipt of incoming information.

The increasing use of e-mail to send attached text files has been causing problems of a different sort in the editorial office. In some cases binary files originating as (say) *Word 6* or *WordPerfect 5.1* files are, instead, turned into a sort of pseudo-ASCII with all embedded formatting and control codes converted to ASCII with the core text itself rendered unreadable.

Various experiments are under way to try and track down the source of the problem. Correspondents may be inadvertantly sending binary files as if they were plain text ones. Alternatively the sending mailer may be doing the stripping and 'conversion'; or it is the receiving mailer that is doing the deed. In some cases a file may have been loaded into the e-mail message instead of being attached (that is, sent as an addendum to) the message.

Whatever the cause may be, it is not only this Editor who is affected. More and more highly sophisticated mailers transfer text out of their own specialised and self-contained corporate environments, and launch it on to other systems. A new form of incompatibility is arising. The internal system that can handle a full character set containing currency, mathematical, typographic and other symbols, may be reduced to incoherence when text embodying those symbols is sent to another system. Even simple formatting commands, underlines and emboldened characters may be distorted or lost in the process. No matter how clever the systems, the bottlenecks between them consist of crude interfaces that resolve incompatibility by reducing it to the lowest common denominator.

If any readers have investigated this problem, or know of experts who can offer solutions, or can provide full or partial 'fixes', they are invited to comment. It may be possible to compile a forum article for future publication.

The wider issue – how to forge reliable communication at a sophisticated level between sophisticated systems – also awaits resolution, and writing up. Do we have any offers?

Peter Gillman
Editor

Comparative disadvantage and special opportunities and the information technology revolution: general considerations and the examination of visual impairment as a case study

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Abstract
It is generally assumed that the benefits of new communications technologies are universal and evenly distributed but this overlooks the concepts of comparative disadvantage and special opportunity. Dyslexic people, for example, were increasingly comparatively disadvantaged in increasingly text-based societies and deaf people were comparatively disadvantaged as text gave way to an increasing use of audio information but the telephone presented a special opportunity for house-bound people as did the electronic amplifier for people with weak voices.

Poor people are almost always disadvantaged by new systems either because the initial equipment or the training to use it are rare and expensive, but both these costs generally fall as time passes, the market expands and the research and development costs fall out of the pricing. The Information Technology (IT) revolution, then, is not unique in its creation of serious, if temporary, comparative disadvantage as well as many special opportunities.

In this paper I will use the example of visual impairment to analyse the impact of communications systems on an identifiable – but by no means identical – cluster before addressing the more general comparative disadvantage and special opportunities brought about by the IT revolution.

Information access and visual impairment

Blind and visually impaired people (I will refer to this group collectively as 'VIPs'*) have only once in history derived a comparative advantage from the invention of a communications system and that was the evolution of braille from its primitive form as a method of carrying artillery adjustment instructions by night; even speech, though conferring a huge absolute advantage to all people, including VIPs, leaves them lacking the facility fully to evaluate oral communication because of the frequent need to interpret it in the context of body language.

The recent trend in information technology from text-based systems such as DOS to graphical user interface (GUI) systems such as *Windows* has raised these issues in a newly acute form the understanding of which is greatly improved by a rapid analysis of previous communications technologies. Whereas Morse code conferred equal absolute advantage on VIPs and their peers, they were comparatively disadvantaged by telegraphy, being able to input but not read the output; similarly, radio conferred equal absolute advantage whereas television created a huge comparative disadvantage, not only widening the information gap between VIPs and their peers but also cutting them out of vast areas of social discourse. People no longer merely talked with authority about their home environment but acquired authority in matters of landscape, custom and judgement from what they saw on television. Whereas two listeners, one VIP and one fully sighted, would be equally placed to judge the accuracy of an umpire's leg before wicket decision in a game of cricket, the VIP was reduced to a parrot by the birth of television and even more by the slow-motion replay.

In principle, the arrival of the mainframe and then the personal computer conferred equal absolute advantage between VIPs and their peers but in practice there was some comparative disadvantage because access hardware and software to validate input and read output were only developed after standard products, so there was a time lag. The access devices also created an extra layer of technology with the potential for error or breakdown so the mean time between faults for access devices bundled with standard equipment was shorter than for the standard equipment itself; and the access technology was often more expensive than the standard equipment it accessed because of high research and development costs and a small market. This last factor was particularly relevant to a group of people who largely rely on state benefits. The UK Government has provided equipment on long loan to VIPs in work but that cuts out huge swathes of activity, including applying for work, and the latest revision to the current scheme, known as Access to

Work requires employers to meet 20% of access equipment costs.

Nevertheless, by the mid 1980s a situation of mild comparative disadvantage in the operation of CP/M and DOS-based systems was close to becoming one of absolute equality of advantage; for close on a decade there were upgrade time lags in accessibility and cost was a chronic issue but VIPs flourished as computer programmers, office workers and fully informed professionals. Then came the GUI.

The full impact of the GUI is still being absorbed by VIPs and those who work with them. The comparative disadvantage has been largely overlooked for three reasons: first, VIPs themselves do not understand the nature of the problem and so, secondly, the false assumption is made, fuelled by a heavy dose of techno-Utopianism, that the change from DOS to *Windows* is of the same nature and scale as the change from CP/M to DOS and, thirdly, and somewhat paradoxically, the very people who have misjudged the situation are competent enough in handling IT so that the general problem is masked.

At a conference on the access of VIPs to libraries (EXLIB, Madrid, 1993) I made the observation that no matter how good an access information system for VIPs it will not be able to convey the smile on the face of the Mona Lisa to which the reply from a VI expert in IT was that a set of fine, varied height pins would be able to convey the information[1]. Access to the Mona Lisa was not a serious matter of comparative disadvantage when it was the preserve of the wealthy traveller or the owner of prints and coffee table art books but it is now a universal icon which has moved from tea towels, T-shirts and posters to the CD-ROM and the Internet art gallery. Whereas only the occasional VIP would formerly have met an art connoisseur, nowadays he might find himself shut out of a conversation about art in his local pub. What began with photography and the cinema has been exacerbated by television and has now become a crisis of competence for VIPs. Whether the material at issue is a Breughel genre picture, a 'trick' of M.C. Escher, a street atlas, an animated cartoon, the controversial plan for a new piece of public architecture, or merely a screen icon, there is an issue of accessibility for VIPs.

The root issues are: how much can access devices convey; and, how much is it worth trying to convey what they cannot through verbal description? The first issue is a matter of scale; make a tactile reproduction too intricate and the finger cannot absorb the information; expand it so that the finger can absorb all the information and the brain might not be able to retain it all in proper orientation and relativity because the overall reproduction is too large. The second issue is much less tractable because it is hard for teaching professionals and VIPs themselves to admit that there must be areas of knowledge to which they will never have full access. Nonetheless, it needs to be faced because in the context of the school curriculum or, indeed, life's curriculum, the more time you spend learning something, the less time there is for something else. There is a point where you have to cut your losses: some people can't draw Giotto's perfect circle; others will never play football for Manchester United; congenitally blind people or those who have completely lost their sight since 1980 are never going to know fully what Madonna looks like. This last at least might be counted a trivial matter but only by those who confine their aspirations for VIPs to academic achievement; there is a great deal of anecdotal evidence which shows that no matter how academically qualified VIPs are it is their social skills which determine how well they are integrated in society.

The case of totally blind people is clear and bleak enough but that of people with residual vision presents a set of complex problems. First, no two people have exactly the same visual acuity and vision perception; secondly, the ability of the brain to interpret what is transmitted to the visual cortex also varies; thirdly, what the brain 'sees' depends on the predictability of the visual environment; people with residual vision, for instance, recognise colleagues at a given distance in a familiar environment and context (where they would expect to meet them) but not at the same distance in an unfamiliar context as in the case of the nurse who meets a former patient in the street and remarks: "Mr. Smith, I hardly recognised you with your clothes on!" Finally, as is the case with totally blind people, those with residual vision need to know different kinds of things depending on their lifestyles and aspirations. There is no uniform way of providing compensatory oral information to those who have imperfect access through vision.

Incomprehensibly, some important assistive technologies have not yet been invoked to help VIPs with residual vision. Just as television was largely banned in schools for VI children even though it could have helped enormously in providing panoramic images for those with very poor distance vision and just as the video was overlooked even though its full colour image capacity was far superior to the specialist, skeletal black on white closed circuit television in explaining such phenomena as how a horse gallops, now commercial image magnification and image enhancement are still firmly out of bounds. The explanation for the exclusion of television and the video was a purely puritanical response to entertainment technology but there is no such excuse in the case of image enhancement; it has been used in what we used to call 'Fleet Street' for years (just as the fax was for many years before it 'broke out').

If there is much need for more research into the relationship between the eye and the static and moving image, there is even more need for it into the relationship between them and the impaired eye. We do not know, for instance, whether learning to read text on a printed page and learning to read text moving across a screen hamper or reinforce each other.

The reference to text on screen naturally leads to the issue of using computer systems for information transactions rather than for simply looking at pictures. The GUI revolution presents a temporary crisis in text access for VIPs but this will be overcome in the next three years through software which turns the bit maps back into DOS-like characters – which software can turn into braille or synthetic speech – in much the same way that optical character recognition (OCR) software turns images into DOS. There will continue to be access software lags just as there were in the DOS era but these are now shortening as they did then. The central problem for VIPs in this new GUI era is their comparative disadvantage in information processing. A person with full vision can scan 20 boxes, select three options, click and then access the selected files. A VIP with a 'soft braille' output device, a speech synthesiser or magnification software has to move deliberatively through all 20 options before making selections. This is comparatively costly in office time – the employer gets fewer transactions per hour – and in the Internet environment it means higher telephone bills. We could be seeing the end of the VI computer programmer and office worker and a deterioration in the comparative effectiveness of VI professionals.

Although there is both an input and an output deficit for VIPs in the field of IT, the output deficit is by far the greater but its inevitable consequence will be to increase the former; the less sense you can make of your environment the less you can contribute to making sense of it. The cultural value placed upon self-expression rather than benefiting from the accumulated wisdom of others is now higher than it has ever been in recorded history and this accounts for the amount of emphasis placed on it in the VI world, but to master the technicalities of input is to deal with the simplest problem; to master the syntax and context of input requires access to the output of peers and of mavericks; browsing – which we do every day in the mere act of walking in the street – is more important, at least in quantitative terms, than looking up references. Yet this is the precise area where visual impairment presents the greatest difficulties. We have taken our browsing from the street to the screen and in doing so we have increased comparative disadvantage for VIPs from the equivalent of a cage to a dungeon with a tiny window above eye level. Little wonder that this is hardly a matter for general academic discourse when it is not even a subject of concern in the narrow professional world of visual impairment itself.

One could understand the reluctance to withdraw if the picture were uniformly bleak but there are some significant special opportunities. If research into the use of residual vision can minimise the number of those who cannot benefit from visual stimuli – this is a key but overlooked priority – then image enhancement in two dimensions and 'virtual reality', supported by commentary, present a stunning prospect; moving images can be arrested so that the mechanics of motion and changes in facial expression can be analysed, images can be de-constructed so that their components can be apprehended and manipulated into new orientations and relationships. At the text level, voice-in/voice-out presents some problems, particularly in output editing predictive packages, but the benefits are enormous. Familiarly, the problem will be with editing and accessing output but it can not be too long, surely, before industry recognises the folly of turning its back on Adam Smith's principle of the division of labour. Above all, perhaps, the technology's flexibility will allow us to understand better how impaired vision affects individual capacities both in terms of the image and text; in the latter case we must see off the notion of a standard for 'large print' and allow each person to have the print of his or her choice which might vary according to the environment in which it is being used and even the time of year.

In the case of visual impairment, disadvantage can never be eliminated and so we must concentrate on reducing it to its absolute minimum by concentrating on special opportunities.

Information technology: comparative disadvantage and special opportunities

There is a sense of the 'half empty glass' in putting the disadvantage before the opportunities in the case of IT but the order is dictated by the reality; the advantages of IT are much more widely understood than the comparative disadvantage. It was with both these phenomena in mind, but with an initial emphasis on the 'downside' of the new technology, that I decided to establish an organisation specifically to look at IT as a two-sided coin; its name is AEIOU – Access Enterprises for Information Opportunities Universal.

The first priority has been to disseminate the analysis and counter techno-Utopianism. There are a large number of identifiable groups of people within rich countries and whole poorer countries which are at once severely comparatively disadvantaged by the IT revolution but which, flipping the coin, could benefit enormously from the special opportunities it presents. Here are some brief examples:

- Sub-Saharan Africa will be left even further behind the rest of the world in GDP per capita if it lacks access to the global communications system; conversely, although it is short of natural resources it is ideally suited because of its pool of unemployed graduates and its position on the globe to provide overnight 'back office' facilities for American service industries such as insurance.
- The gap between almost all kinds of disabled people and their peers has been widened because of the huge increase in the speed of information processing; conversely, predictive voice-in/voice-out word

processing will enormously assist people who are dyslexic, visually impaired or physically disabled.

- Many people are intimidated by the technology itself and by the impenetrable manuals that come with it; conversely, the new graphical and interactive technologies can make on-screen learning much easier than using a textbook.
- The speed of IT evolution and revolution prevents most people, but particularly the poor, from accessing new hardware and software; conversely, the faster the technology develops the more second hand hardware and software will be available for little or no cost.
- The Internet is dominated by 'Western' information; conversely, it could be used as a tool to create a dense network of non-Western interchange.

These five examples show that the comparative disadvantage will not disappear but, if the opportunities are seized, it will be made relatively smaller. The pre-requisites in all cases are: general background information on the potential disadvantages of being left out; the special opportunities of becoming part of the IT revolution; and access to appropriate education strategies such as using interactive and/or distance learning and getting training out of further and higher education environments into public libraries and high streets.

After basic knowledge and appropriate education, the next step must be to provide reliable second-hand hardware and software. AEIOU wants to regulate the second-hand IT market in much the same way as the second-hand car market has been organised. It is not enough for a few companies to dump their pre-386 PCs on the doorsteps of charities and leave them to sort everything out; cleaning hard discs, checking that things work, re-installing operating systems and applications software all take time and often money; and shipping kit to where it is needed also uses resources. The IT industry itself should take responsibility for establishing a credible, regulated second-hand system rather than leaving it to the voluntary sector to spend substantial amounts of its scarce resources on trouble-shooting, improvisation and piecemeal service delivery. A recurring theme in AEIOU's thinking is that this will be to the advantage of the IT and telecommunications industries; to follow our analogy with cars, the first car is very rarely a new, full-price model; people start with an 'old banger' and work their way up the retail ladder. How much more will this be the case with IT; people might just buy a new car when they pass a driving test but why should they buy a new computer when they barely know how to use the opening menu?

The advent of the Internet has also produced a requirement for flexible and concessionary telephony. There is no reason why the sophisticated billing systems of our major telecommunications companies should not operate concession schemes for the Internet operations of schools, disabled people or people currently receiving the Job Seeker's Allowance. There is no reason, either, why the same companies should not make differential charges between countries, regions within countries or even establishments like universities. Again, greater habitual use will increase long-term market prospects.

Many of these benefits depend upon a successful and sensible global regime for intellectual property rights which guarantees a balance between the right of the creator to fair remuneration – a necessary precondition for the expansion of information creation – with the Fair Dealing principle established most notably in the UK. This is not a direct concern of AEIOU but it is one which we will watch with great interest.

At the core of the AEIOU analysis is the symbiosis between social concern and good business. Unless IT and telecommunications companies can genuinely expand their markets within rich countries and move into poorer countries they will be locked into an endless cycle of cosmetic re-modelling. Under UK Charity Law we cannot, of course, accept money from a commercial company to expand the market for its particular product but we will ask all of our project beneficiaries to measure their IT and telecommunications purchasing behaviour so that we can measure how it has increased after we have provided assistance; we believe that we can then clearly show a measurement for enlightened self-interest.

The core staffing of AEIOU will be kept to four people. We will use the World Wide Web to seek project proposals and expert help and the main activity will be matching these; we will then provide projects with appropriate structure, governance mechanisms and start-up funding and then either float them off as independent entities or find them an appropriate 'umbrella'. We will have to abandon the traditional model of a year each for project design, fund-raising and negotiation and testing; the IT revolution is proceeding at such a pace that the priority will be rapid decision-making and implementation: some of our projects will fail; many will become rapidly anachronistic; but the hope is that some experiments produce models that are robust in a rapidly changing environment.

All donors, experts and beneficiaries will be invited to become Members of the AEIOU Forum which will evaluate all past projects and discuss all substantive applications; the administrative costs of AEIOU will be met from Forum subscriptions.

A longer-term concern is the effect of the Internet on the ability of democratic governments to communicate with their people when serious public affairs media are in competition with global entertainment and sensational news coverage; an even greater concern is the distinct probability that the Internet will undermine company and personal tax bases[2].

The challenges of the IT revolution are great and the opportunities are many but its impact will not be properly understood until emphasis moves from the way the technology works to what it means.

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Biographical note

Kevin Carey is the Founder Director of AEIOU (Access Enterprises for Information Opportunities Universal), the Editor of the *British Journal of Visual Impairment*, the founder of the Information Technology and Visual Impairment (ITVI) Round Table and a Member of the Expert User Group of the European Union TESTLAB programme.

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* In this context 'blind' means having no light perception; this term applies to approximately 5% of those in the United Kingdom who are registerable as "blind"; 95% of this group have varying degrees and types of residual vision. Whereas there is a sharp division between the two groups, the latter group represents a broad if untidy continuum of visual acuity and perception. Where a distinction needs to be made between the two groups I will be specific.

The benefits of a knowledge culture

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Paper presented at the Aslib conference on 'Evaluating the intranet as part of your knowledge management strategy', 26th and 27th September 1996.

Abstract

Current received wisdom would seem to suggest that a simple deployment of web-based technologies will provide the platform for competitive differentiation in the dynamic and agile world of mass customisation. It is argued here that technology is but one element of infrastructural renovation required to support intranet applications. *An emerging pattern in these applications is support for the soft networks which exist within all organisations and which embody the key raw asset for competitive advantage: knowledge.*

The discussion reviews the emergence of Knowledge Management as a discipline, presents a model for the flow of commercial knowledge through an organisation (Knowledge Economies), and looks at the cultural and organisational ramifications of knowledge programs (Knowledge Cultures). On this basis the technological superstructure is discussed in the context of one intranet application: Corporate Digital Library.

The principal assertion of this paper is that applications of this type can only be said to be commercially successful when they are deployed in support of knowledge-based initiatives where first order benefits can be realised, improved market performance in particular. A proto-typical benefit statement is provided.

Introduction

It is now generally agreed that in post-industrial, global economies, information has become a capital good with similar value to labour, materials and financial resources. The marketing and use of this good, its continuous refinement towards a particular end – its smelting and milling, if you will – precipitates a knowledge which is necessarily highly specialised.

This is of course perfectly consistent with history, which is to say that there is nothing particularly remarkable about this fact. Peter Drucker in his seminal *Post-capitalist society*[1] traces the application of knowledge from the Industrial Revolution, through the Productivity Revolution of Frederick Taylor to the Management Revolution of the last 50 years. What is remarkable however is that there has been a fundamental change in the significance of knowledge in the new society: knowledge is not now just a resource but *the* resource.

The call for knowledge is apparent at the *macro* level of global markets and trends, the *meso* level of inter-firm networks and value chains constructing and delivering value to customers, and at the *micro* level of the organisation itself; within the soft networks.

At the macro level, the shift to knowledge as the basic resource means that:

> ...while the world economy will remain a market economy and retain the market institutions, its substance has been radically changed. If it is still capitalist, it is now dominated by information capitalism. The industries that have moved into the center of the economy in the last forty years have as their business the production and distribution of knowledge and information, rather than the production and distribution of things. The actual product of the pharmaceutical industry is knowledge; pills and prescription ointment are no more than the packaging for knowledge. There are the telecommunications industries and the industries which produce information-processing tools and equipment, such as computers, semiconductors, software. There are the information processors and distributors: movies, television shows, video cassettes. The 'non- businesses' that produce and apply knowledge – education and health care – have in all developed countries grown much faster than even knowledge-based businesses.[1]

At the meso level of inter-firm linkage in the value system, Clark and Staunton[2] have described a pervasive pattern in which inter-firm networks are built around the value of accumulating, codifying and distributing knowledge:

> The restructuring of international economies is currently accompanied by the weakening of many interorganisational linkages whose texture and significance for innovation and survival was [sic] not fully appreciated. In particular, many vertically-connected firms in established sectors have sought to offload those parts of their operations which are most risky or difficult to transform. Also, many sectors contained firms which were implicitly bonded – albeit loosely – in common forms of lobbying, of regulating activity, and

> of accumulating their learning and recipe knowledge... Some sectors came to occupy key roles relative to their surrounding network. In the engineering industries for example, the capital goods firms, especially machine tools, implicitly occupied the role of pooling and circulating learning both embodied and unembodied... It seems obvious that certain firms come to occupy a pivotal role in being the locus of initiatives for generating innovations which become diffused to their suppliers, and for reinventing generic innovations to specify the detailed contingent features of particular contexts. These central firms become [design centers,] nodes for various chains to reach backwards and forwards down the chains of supply and delivery.[2]

And, finally, at the micro level within the individual firms, there are more than enough management texts which encourage the empowerment of the workforce to generate knowledge for the organisation's use. Goldman, Nagel and Preiss[3], in their overview of corporate agility, remark that:

> Most large organisations have systematically stamped out entrepreneurial behaviour because it disrupts mass-production harmony. Now, suddenly, because the old ways no longer work, we are asking people to be more entrepreneurial and to think... If it is true that organizations sell the skills, knowledge and expertise of the people who work for and with them, and if it is also true that those people think, learn and innovate only 5 to 15 percent of the time, then it seems possible to triple the effective output of an organisation by moving the effectiveness in thinking, learning and innovating from 15 to 45 percent... In agile competition, thinkers are the basis for success; it is the nonthinkers who can destroy the system.[3]

If it is accepted that knowledge is broadly speaking the key to effective competition, marketplace distinction and profitability in post-capitalist society, then an immediate problem arises for the typical organisation in the New Economy:

- There is no commonly-held model for knowledge creation and dissemination within that organisation.
- There are no processes or systems focused on supporting those activities.
- There are no metrics for evaluating the role of effectiveness of knowledge creation and dissemination activities.
- There are no systems focused on measuring and evaluating the various knowledge creation and dissemination processes in the organisation.

In the absence of these, management embarks on one of two broad courses of action:

- A broad call for 'learning' and knowledge development at the 'cultural' level that fails because it is not supported by the firm's reporting structures, compensation mechanisms or operational procedures.
- A similar broad call, supported by an attempt to underpin such 'calls for knowledge' with the conventional measurement and command-and-control mechanisms at management's disposal, which – because these systems assume that what is being managed is either a tangible or a financial asset – fail to support, measure or reward knowledge-creation and knowledge-dissemination processes.

The challenge, for an organisation whose strategy requires effective participation in knowledge-intensive sectors of the global economy, is embodied in the answer to six key questions:

- What does our culture, and our actions as managers, say about the value of knowledge in the firm, and what do we ourselves believe about the value, purpose and role of knowledge?
- How is knowledge created, embodied and disseminated in this firm, and what is the relationship between knowledge and the innovations and performance this firm requires to succeed in its strategic objectives?
- What strategic and material commercial benefits do we expect to gain from more effective knowledge management and the performances created by effective knowledge management?
- Where is our firm in terms of the maturity of its knowledge systems?
- How must we organise for knowledge management?
- What role does information technology play in our knowledge management program?

It is apparent that the information technology support for knowledge-based initiatives is only one element in infrastructural renovation; the organisational and cultural considerations are, arguably, far more profound. The following section looks at the basis for commercial knowledge as a precursor to a discussion on support for commercial knowledge creation, embodiment, dissemination and use.

Data, information, knowledge and wisdom

Where is the wisdom we have lost in knowledge?

— T.S. Eliot

While some practitioners use the terms *data, information,* and *knowledge* interchangeably to 'avoid tedious repetition'[4], it is important to recognise at the very least the difference in usage models.

Data are not knowledge. As anyone who has worked with raw data will agree, mere data points are meaningless in and of themselves. In knowledge management models it has to be recognised that data are ubiquitous, universally available and *essentially worthless*. Whether the data comes from the organisation's data capture [OLTP] systems or outside sources, data are the raw material of knowledge creation.

At a minimum some mechanism which selects certain data points in preference to and instead of others is required. This interpretation will almost certainly involve the recognition of relationships between data points in order to derive data *sets*. Data sets or better the relationship between data sets is the minimum criterion for information.

Information is not knowledge. Rather information is the potential for knowledge. Knowledge can only be derived from information through the monitoring of use cases. Consider the use case of *decision making*. The information on which a decision is based is gradually modified over time as the outcome of numerous decisions integrates information points into knowledge. At a minimum, it is the transformation from the learnt *know-what* to the experienced *know-how*.

Knowledge then, can be considered as output(s) from a continuous feedback loop which refines information through the application of that information. It can have both positive and negative manifestations; that is to say that the transformation of information to knowledge occurs through observing both positive and negative outcomes of the application of that information. When *know-how* around one subject area is considered in the context of the organisation as a whole, then a broad *know-why* becomes apparent in that individual knowledge becomes integrated with a larger body of knowledge with organisational (or societal) ramifications. Knowing more than the sum of the individual contributions becomes possible. At this stage we may speak of *wisdom* which is a recognition of the relationships between things. With wisdom comes the notion of *care-why*, a self motivated creativity based on will, motivation and most importantly flexibility[4].

However, a certain pragmatism must rule here. We are not concerned with an absolute theory of knowledge, Plato's justified, true, belief, rather we are concerned with a *commercial knowledge*. The goal of commercial knowledge is not truth but effective performance. Consider the following much-quoted passage from Borges' essay The analytical language of John Wilkins.

> On those remote pages it is written that animals are divided into (a) those that belong to the Emperor, (b) embalmed ones, (c) those that are trained, (d) suckling pigs, (e) mermaids, (f) fabulous ones, (g) stray dogs, (h) those that are included in this classification, (i) those that tremble as if they were mad, (j) innumerable ones, (k) those drawn with a very fine camel's hair brush, (l) others, (m) those that have just broken a flower vase, (n) those that resemble flies from a distance.

What is fascinating about this quote, as much to the author as to Wilkins himself, is that the knowledge contained therein should have any application. It strikes one so since it both lacks internal symmetry and balance and the distinctions it draws do not readily correspond to categories used currently in everyday life. The fact that it is drawn from a 14th century Chinese manuscript presumably means that first of all it was expensive to produce and second, therefore, that it must have been of benefit to the court philosophers who wanted this kind of knowledge recorded. That is *it worked for whatever purpose it was developed.* If commercial knowledge is about 'what works' or even 'what works better' in pursuit of economic performance, then partial, empirically incorrect or even philosophically muddled bodies of knowledge which have been or are effective are valid commercial knowledge bases.

Commercial knowledge, for present purposes, should be thought of as:

> an explicitly developed and managed network of imperatives, patterns, rules and scripts embodied in some aspect of the organisation, and distributed throughout that organisation to create marketplace performance: in creating or enhancing customer relationships and their associated revenue streams; in achieving operational efficiencies; and in creating optimal products and services for the markets served.

In summary then the knowledge management process may be considered as:

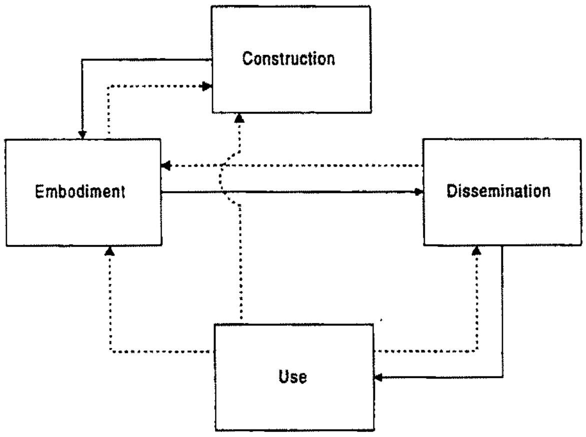

Figure 1: Generic knowledge management process

The purpose of knowledge construction is of course knowledge use. However in making an individual's *tacit* knowledge *explicit*, that knowledge needs to be embodied in order to be disseminated to the organisation as a whole[5]. There is a certain amount of simultaneity along the various flow paths. First the system embodies a closed feedback loop as discussed previously such that generic knowledge is gradually refined and specialised over time. Second there is a degree of testing-for-use-value in the construction stage before the knowledge is embodied; refinement in use is seen simply as an extension of this over an extended time scale with a larger user population.

Understanding how these processes function at the macro, meso or micro levels, making decisions about the best methods for each process including the preferred vehicles for embodiment and dissemination and, finally, identifying an effective set of measurements for monitoring the entire system is the key for successful knowledge management. A fuller discussion on the theory of knowledge management is outside the scope of the current paper which rather considers the underlying organisational, cultural and technological requirements to support the transformation of tacit to explicit knowledge for the benefit of the organisation as a whole.

Considerations

Despite the large number of observers of business and society who have recognised that knowledge is the new competitive resource[1,4,5,7], few have considered the mechanisms and processes through which knowledge is *created.*

Explicit knowledge is something formal, systematic, it can be expressed alphanumerically and is easily communicated in terms of hard data, scientific formulae and the like. Tacit knowledge, on the other hand, *individual* insight and innovation, is actually of more value in terms of potential marketplace performance. Tacit knowledge is generally not easily visible, often not even expressible, highly personal and hard to formalise.

While explicit knowledge is relatively easily processed by computer, transmitted electronically and stored in databases for perusal and discussion, tacit knowledge needs similar expression before it can be understood and developed further. The difference is that that expression will require more than just two-dimensional alphanumerics. It will undoubtedly require a far richer multi-media platform with many dimensions to facilitate the most effective communication*. It is precisely during this transformation from tacit to explicit knowledge that the *embodiment* process takes place. Indeed one of the fundamental assumptions of the present work is that knowledge, when it is embodied, most often appears as a document of some sort. A *document* is a concise way of describing what is essentially a multi-media container, see below.

There are many issues which need to be addressed within both the culture and organisation of a company, in the construction and use of knowledge, as well as the technological infrastructure required to support its embodiment and dissemination.

Cultural impacts

First and foremost, knowledge is created through human interaction; it *is* a *cultural* product. In any organisation there are a number of interlocking networks of people which are not apparent in any organisational chart and could never be so. By and large they exist outside formal cultural rules, are often hidden but are nonetheless extremely robust. The individuals within these networks are the keepers of knowledge**. They do not give their knowledge away but barter, trade, and exchange within an intra-firm economy with its own currencies.

For many organisations an early but major challenge is simply to create a culture where individuals are encouraged, if not given incentives, to share knowledge. Failure to share knowledge can occur both cross-functionally and intra-departmentally. The former is usually the result of organisational politics where certain constituencies are aligned with others with whom they share and arraigned against others as adversaries with whom they do not. The latter is more often a reflection of organisational stability: when jobs are at stake, networks are withdrawn and individual knowledge is closely guarded as protection against termination.

In order to support a Knowledge Culture it is sufficient initially to recognise that these networks exist, to observe them in action and to attempt to underpin them where there are opportunities for improvement (with groupware products for example). Only then, once the processes are understood, can the economy be investigated. All classical economic models are apparent: laissez-faire, state capitalism, socialism, communitarianism, supply-side and demand-side. Which approach to adopt depends on a large number of factors including the culture of the company as it currently exists, whether the objectives are based on cost reduction or revenue enhancement, the relative value of the knowledge to both the individual employee and the firm itself and so forth. This is *not* easily resolved and may require more than one iteration; clearly consensus is a pre-requisite for a successful programme. Subsequent management of the economy relies on being able to measure knowledge flow within the firm. It is only at this stage, once the economy is measurable, that intervention can be contemplated with the objective of improved market performance.

The only valid axiom in this context is that if knowledge exists it spreads. The spread and growth of knowledge actually underpin the Information Age. In the process it changes, in that it can grow, it can decay and it can be or become toxic. As an asset however, it depreciates neither through use nor duplication***. The test of a knowledge management system is ultimately whether it is considered to be an explicit objective of a firm's operations or a by-product of them.

In the second section of this paper, it was stated that broad cultural calls for knowledge creation generally fail if they are not supported by cultural reinforcement with respect to understanding how knowledge is disseminated within the organisation and reward given for knowledge sharing. Furthermore without changes to the reporting structures[9], compensation and operational procedures, knowledge programmes treat knowledge as 'the happy effluvient of doing'[10] and have little hope of delivering knowledge to the marketplace in terms of improved efficiencies and performance. As an integrated part of an organisation's strategic thinking on the other hand, knowledge management initiatives will be seen to have wide ranging effects across the organisation as a whole.

Organisational impacts

If it is accepted that Knowledge Management is in fact the management of one of an organisation's principal assets then the same rigour should be applied as that exerted by the Chief Financial Officer (CFO) in the management of physical and capital resources. In terms of accountability then, the appointment of a Chief Knowledge Officer (CKO) to manage the organisation's tangible and intangible *intellectual* assets is mandated. The CKO is concerned with four broad areas of responsibility: how does knowledge get constructed in the organisation in the first place, the cultural dimensions discussed in 'Cultural impacts' above; how does knowledge, once constructed, get embodied in usable form, how should the human and technical infrastructure be developed to support (or repress) particular kinds of embodiment; how does embodied knowledge get disseminated to the various points of use within the organisation, the instrumentation issues discussed previously; and finally, how does embodied, disseminated knowledge get used (or not get used) within the organisation, where and when to intervene.

The office of the CKO would typically report to the Chief Operating Officer (COO) for two reasons: first, knowledge management programmes require fundamental change in the organisation's infrastructure, processes and behaviour. Many of the issues raised in this regard require a review of the role of the Human Resources function with respect to the strategic evolution of the firm. This degree of change requires executive *gravitas* to drive the programmes to successful completion. Second, the effects of the knowledge managent programmes are designed to be operational: effects on the top line, the bottom line and the organisation's cost structure.

While the technology is non-trivial, it will not make or break a Knowledge Management programme: the human support infrastructure (librarians, publishers, design teams) will. Indeed, any methodology which is targeting Knowledge Management needs to address the definition and installation of that support infrastructure.

From a quality perspective, there is a requirement to provide control and assurance with respect to knowledge currency, effectiveness, context and toxicity. This function is provided by publishers. The prevailing publishing model inside the organisation today is along the lines of *drop it in the filesystem and modify a few HTML files.* This model is insufficient, not least because it fails to capture any metadata about the content. This issue is addressed more fully below.

The librarian provides a centre of co-ordination for the publishing resources. The *Webmaster* is essentially the Database Administrator for semi-structured data. And, finally, the designers. During the last 50 years, theorists such as Buckminster Fuller have re-defined design to be seen as a process of integrating information (knowledge?) from diverse fields. The goal is to create cohesive systems: visual appearance is only one factor. Web designers who restrict their efforts to the aesthetics of Web page design tap only a small part of the Web's potential.

In summary the organisational considerations are represented as shown on Figure 2 opposite.

The intelligent desktop has become the modern corporation's standard analytic platform. What these desktops produce are *documents*. These documents embody a substantial part of the corporation's knowledge, as well as a substantial part of the corporation's best business practices. Unfortunately, these documents can neither be disseminated nor used effectively by the corporation.

The intelligent desktop, as it is defined by Microsoft and other desktop franchise technology providers, is fundamentally designed to support analytic work: the business of knowledge workers. Traditional client/server OLTP and DSS systems support that analytic work, either by facilitating the capture of structured data from the intelligent desktop, or by delivering structured data to that desktop. But neither OLTP nor DSS do much to facilitate the actual analytic work that occurs *on* the desktop. That work is facilitated, if at all, by so-called personal productivity tools – wordprocessors, spreadsheets, graphics tools and presentation packages – and by analytic tools that absorb, process and arrange structured data from production data sources: query tools, report writers, and the like.

The product of the analytic work that occurs at the intelligent desktop is nearly always a document, in the broadest sense of that term: large, complex multimedia objects that represent both the models and methods used in the analytic work and the results of that work. Marketeers produce product requirements in the form of wordprocessing documents, segment profitability analyses in the form of spreadsheets and sales tools in the form of presentations. Designers produce product specifications in the form of CAD drawings. Manufacturing personnel produce work process descriptions in the form of flowcharts. Increasingly, firms are implementing performance support systems (PSS) for training their employees, that depend on the most complex and costly kinds of documents: multimedia objects that include sound and full motion video. And more and more firms' business processes depend on software: yet another kind of digital document.

In current business practice, these documents are both routed through the enterprise, and stored somewhere in the enterprise. Increasingly, routing is done using electronic messaging environments, leading to the replication of the document in dozens or

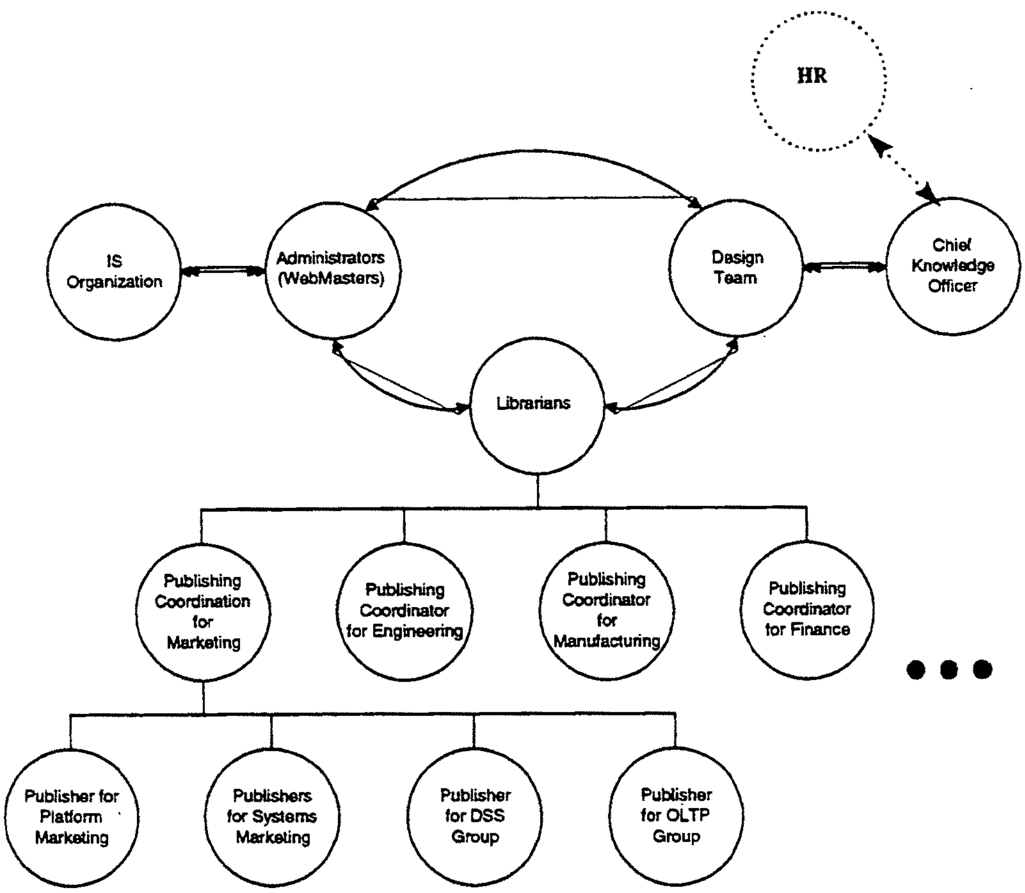
HR
IS Organization
Administrators (WebMasters)
Design Team
Chief Knowledge Officer
Librarians
Publishing Coordination for Marketing
Publishing Coordinator for Engineering
Publishing Coordinator for Manufacturing
Publishing Coordinator for Finance
● ● ●
Publisher for Platform Marketing
Publishers for Systems Marketing
Publisher for DSS Group
Publisher for OLTP Group

Figure 2: Organisational infrastructure

even hundreds of locations throughout the enterprise, and the subsequent ageing-into-obsolescence as each copy of each document gathers electronic dust in a file system somewhere. Similarly, most documents are stored either on local hard disks, where they are inaccessible to other knowledge workers, or in data junkyards on shared file servers, where the documents' content and value are utterly hidden beneath cryptic file names and complex directory structures.

The document is clearly the single most important trace of the firm's knowledge processes. Some estimates suggest that as much as 90% of the firm's operating knowledge is stored either in these documents or in the heads and work practices of the knowledge workers who produce them[9].

Put simply, the firm's analytic work products, which are increasing in number, complexity and importance, are:

- unmanaged
- difficult to find
- impervious to scrutiny.

Although most firms do a good job of managing their structured data sets (using relational database technologies, for example), their unstructured and semi-structured data are unmanaged and (as things stand) unmanageable.

The net effect of this 'document problem' is that

- The corporation's knowledge and best practices are embodied not only in structured data in database management systems, but in semi-structured multimedia documents produced by knowledge workers and their intelligent desktops.
- The corporation's knowledge and best practices are immediately distributed and stored in ways that prevents the information from being used effectively, and that in fact encourage the knowledge and best practices embodied in the documents to remain untapped by other knowledge workers.
- The corporation's knowledge base is inscrutable – it cannot be queried or reused.

If the firm can control the publication and dissemination of documents, then it can:

- Reuse the knowledge produced in the firm, lowering its costs (through the elimination of rework) and increasingly the quality and quantity of its output and its level of service to suppliers, trading partners, channels and customers.
- Begin to understand how knowledge is created, embodied, disseminated and used within the firm, where and how value is added, and what portions of the firm's knowledge economy need attention and management.

The simplest, and most obvious point of focus, is not on the creation of those documents – on computer-supported collaborative work *per se* – but on the dissemination of those documents: how documents are published, circulated and used within the firm and across the firm's boundaries. That is a dissemination problem from a knowledge management perspective. What is required is an IT infrastructure explicitly designed to allow:

- the controlled, centralised publication of document-based infrastructure
- the capture of metadata associated with each document
- the storage of the sum total of the firm's document base in a reliable, manageable environment
- the electronic distribution of those documents over a standard, ubiquitous electronic infrastructure directly to the point of use
- the capture and analysis of all information related to the flow of documents from publishers to consumers within the firm.

The following schematic provides a high level summary:

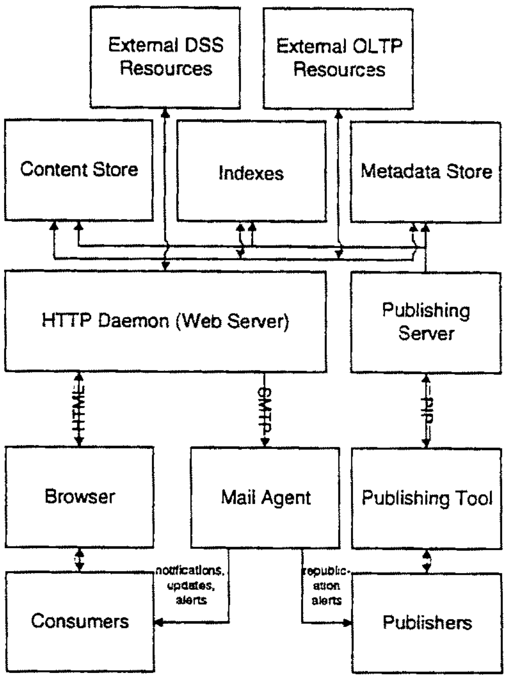

Figure 3: Technological infrastructure

These systems are referred to as Corporate Digital Libraries (CDL). CDLs serve four primary constituencies: consumers, publishers, librarians and management. These constituencies are role-based, rather than job description-based; in other words, any given employee may be both a consumer and a publisher of documents.

From the point of view of use and acceptance, it is vitally important that publishers are able to publish into the CDL very simply: a single request masks the complexities of updating the content store, preparing the document to be indexed, indexing it, extracting metadata from the published document etc. Equally, consumers should be able to locate any document within the CDL regardless of the completeness of their search criteria. The role of metadata in both contexts is crucial. It requires detailed elaboration and is therefore discussed more fully elsewhere[10].

In summary then there are a number of major issues to be addressed in formally exploiting the hidden knowledge culture within an organisation. Cultural issues need to be recognised and resolved early, most probably by effecting some organisational change. Only once any Knowledge Management programme is seen to be an explicit objective of an organisation's operations will success for that programme be possible. Only once this is established are the tertiary problems of technological support relevant. Effective support is based on scaleable systems with well designed publishing strategies and infrastructure. Design is key; design of the metadata is *the* key critical success factor. The following section provides an example of expected benefit from the deployment of a Knowledge Management programme. Pay-back can be expected in one or more of the following: innovation, exnovation, reduced cycle time, reuse, corporate memory, organisational integration and, most importantly, improved competitive position for human assets: *smart people want to work for and with smart people.*

A benefit statement

There is only one good reason to practice commercial knowledge management and that is if it pays. Consider the Brilliant Company with a captive direct sales channel, selling a durable product to commercial firms, operating with the following business model:

Cost of sales as a percentage of gross revenue	52%
R&D expense as a percentage of gross revenue	7.7%
SG&A expense as a percentage of gross revenue	29%
Tax Rate	18%
Shares outstanding	35,000,000

With no Knowledge Management discipline, the firm has 135 sales teams world-wide. Each sales team targets 12 prospects per year which gives 1620 encounters per year. The Encounter to Engagement (win) rate of 35% that gives 1620 x 0.35 = 567 engagements per year and, with an average project selling price of £750,000, the income statement looks like:

Net Sales:	425,250,000
Cost of Sales:	221,130,000
Gross Profit:	204,120,000
R&D Expense:	32,744,250
SG&A Expense:	123,322,500
Profit Before Tax:	48,053,250
Taxes:	8,649,585
Net Income	39,403,665
Shares Outstanding	35,000,000
Earnings per Share	1.13

The firm decides to increase dramatically its sales force which is a momentous challenge for any organisation. Assimilating large numbers of employees who must be productive as soon as possible after hiring is difficult and likely to trigger substantial attrition. To lessen the potential for negative impact, the firm decides to use a Knowledge Management programme to help to integrate the new sales teams quickly and successfully into the organisation.

The Knowledge Management programme targets are:

- reducing cycle time by decreasing rework and preparation
- developing and templating patterns and scripts for prospecting and closing
- building, testing and deploying reusable focused marketing programmes (seminars for example) world-wide to generate direct sales leads
- disseminating best practice in qualifying prospects
- disseminating competitive intelligence
- distributing proven product customisation profiles
- Capturing customer usage profiles and re-using them for targeted marketing.

The emphasis is on reusing what works.

If the programme can effectively support 200 sales teams world-wide reaching 14 prospects per year for a total of 2800 encounters per year with a win rate of 36% translating into 1008 engagements per year for the firm at an average ASP of £800,000 per engagement, then the income statement would now look like:

Net Sales:	806,400,000
Cost of Sales:	419,328,000
Gross Profit:	387,072,000
R&D Expense:	62,092,800
SG&A Expense:	233,856,000
Profit Before Tax:	91,123,200
Taxes:	16,402,176
Net Income	74,721,024
Shares Outstanding	35,000,000
Earnings per Share	2.13

Without the Knowledge Management programme, the income statement looks like:

Net Sales:	630,000,000
Cost of Sales:	327,600,000
Gross Profit:	302,400,000
R&D Expense:	48,510,000
SG&A Expense:	182,700,000
Profit Before Tax:	71 ,190,000
Taxes:	12,814,200
Net Income	58,375,500
Shares Outstanding	35,000,000
Earnings per Share	1.67

Here, it is assumed that the firm successfully assimilates and makes productive all new sales teams in the absence of a knowledge management programme *and* the cost structure stays the same: neither of which is tenable practically speaking.

More importantly, the point here is that *very* small changes made to critical business mode variables – particularly those related to marketplace reach, win rates and ASPS – produced by Knowledge Management programmes have significant far reaching effects in terms of essential business performance metrics. Furthermore, programmes of this type have second order benefits with respect to cost reduction and risk management.

In short Knowledge Management delivers significant returned business value.

Acknowledgments

The author acknowledges the influence of Sequent Computer Systems' CKO, Marc Demarest. The thinking outlined in this paper draws heavily on internal white papers produced by that office and discussions around the broad topic of the evolution of the knowledge society.

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* In language this often involves metaphor and analogy using symbolism to explore meaning.

** The term *keeper* is used intentionally to avoid the debate around intellectual property rights and knowledge ownership.

*** The 'knowledge bank' work by Alan Benjamin former director of SEMA Group, is of interest here. Benjamin reworked the income statement of an organisation to take account of knowledge as an asset of the company which is expressed according to its strategic value. In this scheme all capital spending is an expense... 'In a people world, capital spending just houses people and equips them with something to work with'.

Managing intranets to improve business process

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Paper presented at the Aslib conference on 'Evaluating the intranet as part of your knowledge management strategy', 26th and 27th September 1996.

Abstract

Technological innovations have already provided the tools to transform information management. Now the task is to focus these technologies to improve business process in a world where knowledge and in particular, efficient, timely access to knowledge is a critical economic factor in the commercial success of an organisation. Where intranet technologies have been successfully deployed in businesses, a commensurate transformation in key business processes follows. Investment in intellectual capital, a key metric in the knowledge economy, can be retained through the development of corporate memory. Changes in the nature of information management facilitate structural alterations in essential business processes, with a pay-back in the areas of quality, timeliness, relevance and reduced cost. However, intranet technology is not a painless panacea: it requires a clear business driver and a structured implementation. This paper draws on practical experiences of introducing intranets in a variety of business contexts and highlights the benefits and procedures required to ensure successful implementation.

Introduction

Intranet technology is, arguably, the most tangible manifestation of the shift from an information age to a knowledge age of the kind identified in 1993 by the Institute for Information Studies[1]. To cope with the increasing generation of data and information, improved techniques of storage, indexing, searching and retrieval are required. Whilst intranet tools are providing a means to assist with this transformation, there is nothing revolutionary in their nature: indeed, the phenomenon of the intranet is a logical extension of the empirical and incremental nature of change that has long characterised the Internet. The World Wide Web (WWW) technology employed by intranets has itself extended beyond the early model developed in 1989 by the team led by Tim Berners Lee. Diverse businesses ranging from Glaxo Wellcome to the House of Commons introduced intranets as early as 1993: far from being leading-edge, second and third generation implementations are already in roll-out.

The timely availability of relevant, accurate knowledge is a common business driver underlying the application of intranets in a variety of business contexts. Intranet technology provides the missing software link described in *Towards more healthy living*[2]. This paper draws on first-hand experiences of implementing intranets in organisations spanning the oil industry, the media, financial services and the UK Parliament. One clear lesson emerges from these experiences: that intranet technology frequently enables a more pragmatic, controllable and measurable advance in improving business process than full-scale business process re-engineering (BPR). However, the successful introduction of intranets depends upon developing the technology into a managed process with routine service and not simply as a technology lever desperately seeking a business case.

Generic indicators

A principal interest in intranets derives from their ability to capitalise on ideas, people and innovation, providing a strong return on investment (in its broadest sense). They provide tools that facilitate cost-effective production and co-operative, productive and innovative relationships between employees, suppliers and investors. Importantly, intranets extend the prevailing short-termism dynamic into long-termism through a syncretism of technical and business innovation with financial imperatives. They facilitate long-term corporate knowledge, reduce individual-dependent peaks and troughs in corporate memory and provide a novel form of drawing upon the collective knowledge of experienced personnel, both current and past.

In a knowledge economy organisations cannot afford to under-invest and neglect intellectual capital: intranets provide a return on investment on this key knowledge economy resource. But intranets will not provide miraculous returns in organisations based on rigid hierarchies, intra-organisational competition and bureaucracy, unless a clear objective of their implementation is to help erode such business blockages. Maximised benefits are delivered within flattened management structures and seamless organisational environments: that is, they are a productive layer in knowledge economy engineered organisations, but function to lesser effect in dysfunctional organisational structures. The tendency to establish information systems tied to functional and divisional structures leads to information being incomplete, incompatible or non-existent at the process level: intranets help to avoid this dysfunctional compartmentalisation.

A well-designed intranet provides the potential for a general range of business benefits including:

- improving communications: the potential to improve information flows between employees, customers and suppliers
- reducing geographical constraints: the ability for a world-wide organisation to share information and communicate as a logical whole, maximising its information resources, since the technology reduces potential barriers of time and distance
- increasing access to information: easy access to a range of information through a common single interface available across a range of client platforms
- reducing the cost of doing business: improved access to information provides input to the decision-making process, enabling more timely and better-informed decisions to be taken. In addition, there are possible savings arising from a reduction in the use of other communication methods such as often time- and resource-consuming telephone and fax communications
- reducing the cost of IT operations: Internet-derived technology is generally freely, or cheaply, available and provides an inexpensive means of improving communication and information flows compared to closed/proprietary (and potentially expensive) systems
- increasing an organisation's profile on an international scale: as a seamless international resource, selected components of an intranet can be effortlessly shared via a public interface on the Internet.

A generic analysis of the stages involved in successful implementation of an intranet appears in the October 1996 issue of the *Journal of the IDPM*[3]. This paper focuses on specific applications of the technology in particular organisations.

Case study: Albion Oil

Albion Oil is one of the most successful petroleum exploration and production organisations in the world, with operations spanning all continents. Managing exploration projects in the oil industry is a highly complex and massively data-intensive task. Information assets range from seismological data through financially sensitive projections to highly classified information concerning risks to both capital and personnel in high vulnerability, politically unstable 'partnership' countries. The support systems utilised to assist such billion dollar projects range from specialist engineering Computer Aided Design (CAD) workstations, through to information management mini-computers and desktop computers including PCs and Apple Macs. Delays in accessing information, inaccurate information, corrupt or lost information all carry high financial penalties running into millions of pounds or dollars. Efficient information management across national frontiers and international time zones is the key to successful project delivery and corporate profitability.

Having secured a contract to assist with exploration and exploitation of natural resources in North Africa, Albion Oil urgently required a means of both handling its rapidly growing information assets and communicating efficiently with all members of a project team scattered across Europe, North Africa and North America.

A technical review of the existing infrastructure revealed a mix of Macs, PCs and UNIX systems (both servers and workstations). As well as migrating the desktop platform from Apple to IBM compatibles the company was also in the process of migrating from NetWare to NT. Netscape *Navigator* was the browser of choice since it operated across all these platforms. The project initiation document identified several key business objectives:

- the ability to structure related data within a context (either geographical or textual)
- the ability to share information with a business unit even as that unit dispersed geographically
- the ability to search for data independent of servers and independent of platforms (UNIX, Mac and PC)
- the ability to take a benefit from work undertaken by others as if it were the business unit's own – and, vice versa, to be able to discover what other assets were used across Albion, to leverage their value
- the ability to access key asset information within minutes even when key players were absent
- the ability to share all of the above with related third parties (e.g. business partners)

The scope of the project was restricted to users within the asset involved in the North African collaborative exploration and was defined to include the use of internal Web space, Newsgroups and e-mail. The project was specifically focused on refining processes for assuring the availability, functionality, accessibility and security of information as well as developing the commensurate training and support services.

Key deliverables within the project were the establishment of a User Group, a structured and supported infrastructure (established process with routine service), documentation (user, support and technical), worthwhile information and structured information management. Clear success criteria were defined which included the fulfilment of management's business objectives, providing users with reliable, functional and secure access to information backed up by high quality 24 hour, 7 day support and training (including documentation). On the technical side, documentation, the clarification of roles and responsibilities and mechanisms for addressing security, integrity, reliability, contingency, impact and stand-

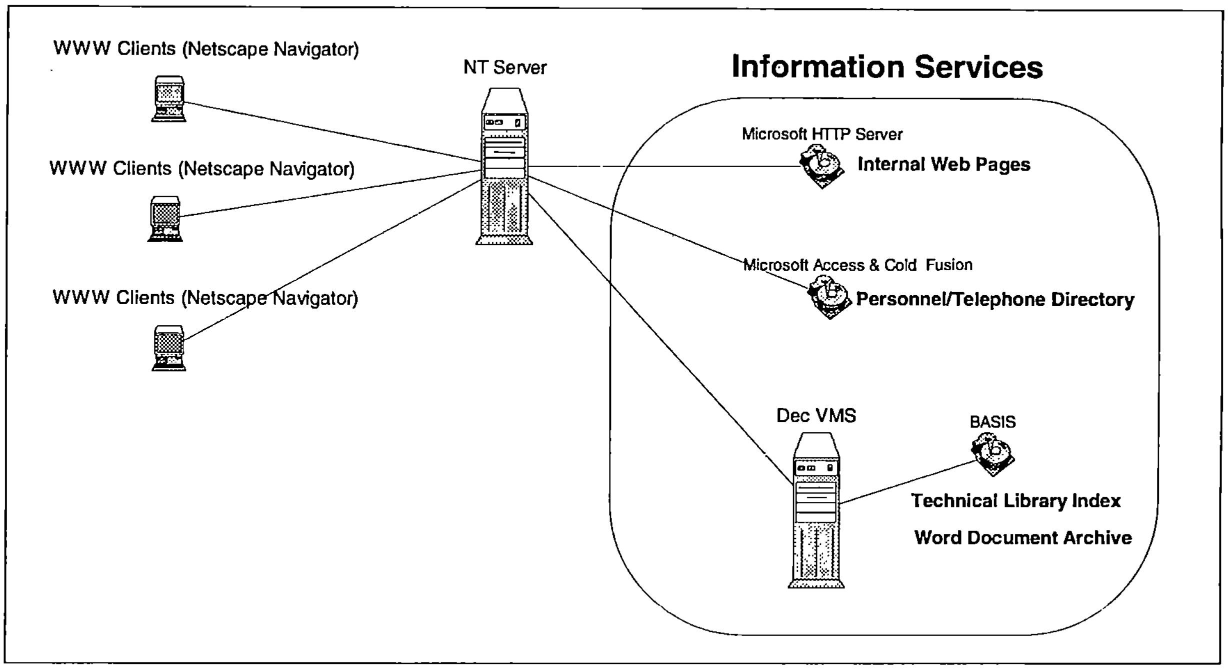

WWW Clients (Netscape Navigator)
WWW Clients (Netscape Navigator)
WWW Clients (Netscape Navigator)
NT Server
Information Services
Microsoft HTTP Server
Internal Web Pages
Microsoft Access & Cold Fusion
Personnel/Telephone Directory
Dec VMS
BASIS
Technical Library Index
Word Document Archive

Figure 1. The Albion Oil intranet

ards were all established as necessary targets. Project frameworks, with clear definitions such as these, are essential to successful intranet implementation.

In terms of information management, clear targets were also identified in terms of 'publishing' information (authoring/origination, formats, ownership and version control, common look and feel), locating information (indexing and search routines, ageing procedures) and Newsgroup netiquette (standards and purging). In overall control was a small, tightly focused cross-disciplinary team which involved the head of the asset's management team, the author and a senior user.

The User Group was to play a key role in ensuring the success of the project. In particular, it ensured that:

- users at all appropriate levels were involved in the project
- users were aware of the business needs
- user acceptance criteria were established
- test data were available when required
- user procedures could be prototyped, refined and documented.

In identifying the service delivery implications, the architecture impact, definition of standards (software, security and configuration), support training, user training and the establishment of a routine service line (allocation of roles and responsibilities, handover to production) were highlighted.

The use of Microsoft Office and its Web browser filters for Word, Excel and Powerpoint documents assisted the task of providing an integrated environment accessed from the Netscape *Navigator* browser. It enabled documents (including management and financial reports) to be retained in their native formats, but viewed from within *Navigator*. Where full text searching of documents was also necessary, the HTML filters within the Word Internet add-in software were used to store both a .htm version (which was indexed and hence transparently searchable) and the native format document. This method provided a synthesis of two powerful components: a fully searchable archive of documents and the ability to download the original or first draft native format documents for comment, printing, revision, incorporation into new documents, etc.

In addition, through the use of third-party products such as *Cold Fusion*, dynamic searching of data held in underlying Microsoft *Access* databases on NT servers was also provided. Albion initially proved this technology within the confines of an online telephone directory of staff, which provided users with full search and display facilities within *Navigator*, but drew data in real-time from the underlying Access database. As project-related data were developed and expanded, as within the multi-million dollar North African collaboration, the same approach was adopted for those data. An additional benefit was that the *ad-hoc* depositing of documents across multiple servers became less problematic: the Web technology indexed transparently across the various servers (initially using WAIS) and provided users with a single view into the underlying complex of data and storage. This meant that servers could be retained for specialist departmental use (e.g. CAD engineering), but made available to a wider project audience. Security was controlled at various levels, including server, network layer, indexing access and Web layer.

As well as delivering a pilot to meet the requirements of the North African asset, experimentation with a Web front-end to the technical documentation library, maintained in BASIS, was also progressed.

Not only did this potentially provide a simple forms interface, but also a development tool for making available the full text of documents (which had previously only been indexed).

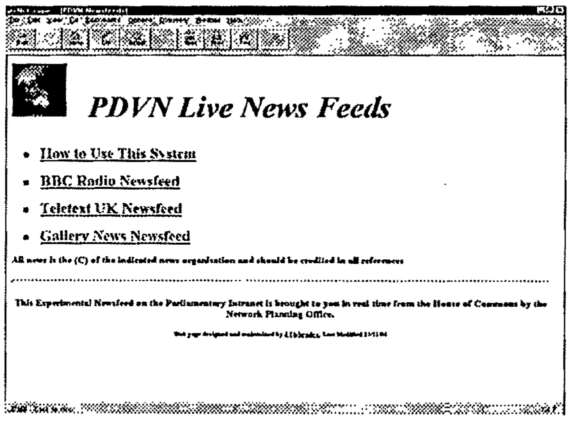
The pilot project delivered a system utilising intranet technology which matched management and user requirements: the technology was clearly focused and not merely applied for its own sake. Working pilots were used to develop and prove the technology before its wider roll-out to a general user base.

Case study: the UK Parliament

The networking of Parliament commenced in early 1992, initially as a pilot project within one building. In 1994 the pilot was debated and formally approved by both the House of Commons and House of Lords and confirmed as a full-scale implementation. As Network Planning Officer during the period 1992-1995, the author was responsible for the strategic and technical development of Parliament's network (which encompassed both data and video), taking it from a zero user base to more than 1,300. This fast rate of growth continues, with around 2,500-4,000 users planned as the network's eventual target. This figure includes MPs, their staff, Peers and staff of both the House of Commons and House of Lords. The technical aspects of this project have already been described in some detail in an article 'LAN about the house: the Parliamentary data and video network'[4] and details of the pilot stage in a report by the House of Commons Information Committee[5].

Alongside this ambitious Parliament-wide project, which utilises high speed fibre optic and switched networks as well as pioneering the use of video conferencing and remote network access from constituencies, a parallel project to computerise the Department of the *Official Report* in the Commons (better known as *Hansard*) was in progress. The resulting system enables *Hansard* to input the full text of proceedings in the Commons Chamber and then submit copy directly to HMSO for overnight printing via a dedicated link. The *Hansard* system provides users with networked PCs running *WordPerfect*. Reporters' returns from the Chamber are typed up and stored onto a central system where they are automatically formatted and organised into the correct sequence in the appropriate layout for Hansard.

The Parliamentary network team had been experimenting with three temporary, free-of-charge, real-time news feeds: one from the BBC, another from Teletext UK Ltd. and one from specialist Gallery News. These were fed into a DOS-based bulletin board system and made available to all users across the Parliamentary network. This provided Parliament with online, timely news information. As part of the experimental work with Web technology, these feeds were also automated and scripted to be deposited on the experimental Parliamentary network Web server. Initial work concentrated on presenting them as a sequence of hypertext links between HTML pages and work was commencing on migrating them to NNTP (i.e. presenting them as newsgroups) as a more effective threading and access mechanism when a decision was taken to withdraw news feeds as a service from the network. Accordingly, the Parliamentary network team abandoned their work in this area.



PDVN Live News Feeds

- How to Use This System
- BBC Radio Newsfeed
- Teletext UK Newsfeed
- Gallery News Newsfeed

All news is the (C) of the indicated news organisation and should be credited in all references

This Experimental Newsfeed on the Parliamentary Intranet is brought to you in real time from the House of Commons by the Network Planning Office.

Figure 2. The Pilot Newsfeed for the Parliamentary intranet

In the early stages of Parliament's intranet development, two Windows browsers were common currency: *Cello* and *Mosaic*. In addition, for DOS users a product called *Lynx* was evaluated. This enabled DOS users to read the textual content of WWW pages, although graphical content was not reproduced. In the event it was decided not to make DOS access available since it presented an unacceptable financial and support burden on the limited network budget. An increasing number of new services offered across the network were Windows-only because of the declining commitment to DOS from most application developers.

In order to establish the pilot intranet at minimal cost, both Hansard and the Parliamentary Data and Video Network (PDVN) initially used the NCSA Web engine running on SCO Unix platforms, maximising the return on existing hardware and software investments. As part of a post- implementation review, decisions could then be taken about the long-term platform of choice and the support overheads involved in up-scaling the service. Initial pilots of both the *Hansard* and the Parliamentary network service were made available to selected users, including MPs, and feedback was positive. In particular, the availability of online, fully searchable *Hansard* text was well received and the up-to-date Parliamentary network intranet bulletin board was a significant improvement on the old DOS-only service.

Initial technical problems centred in particular upon both browsers' tendency to crash from time to time and their almost non-existent and highly idiosyncratic printing facilities. Even the first versions of Netscape's browser suffered similarly with printing. Despite this, Hansard and the Parliamentary

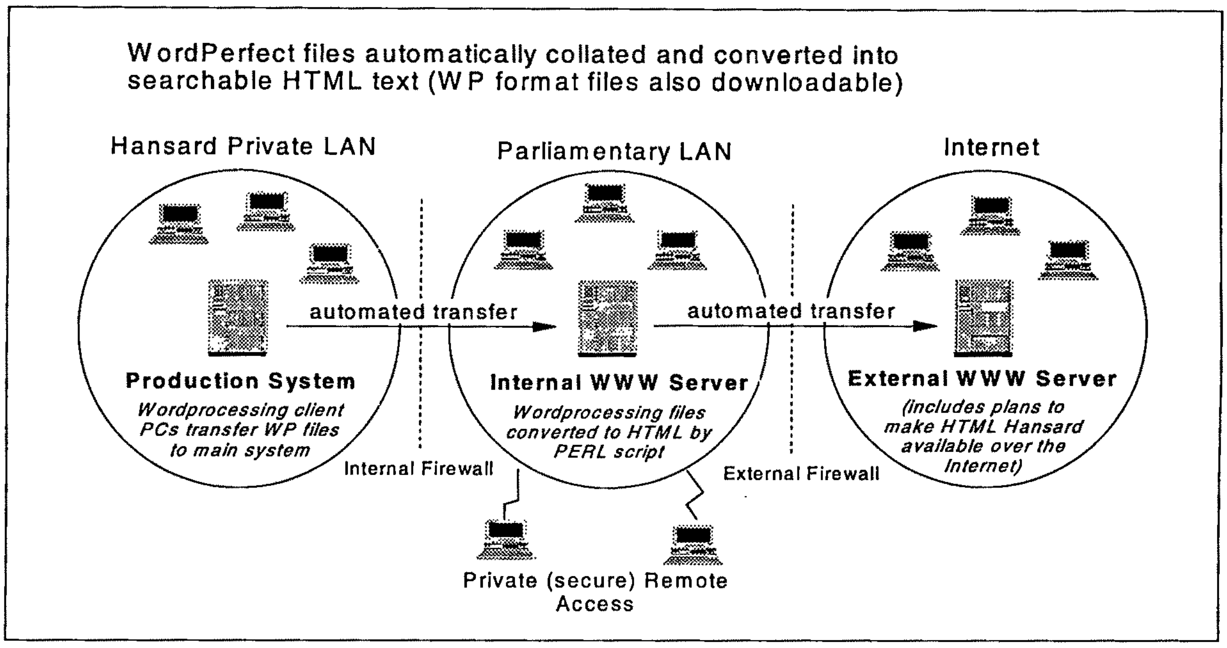

WordPerfect files automatically collated and converted into searchable HTML text (WP format files also downloadable)
Hansard Private LAN
Parliamentary LAN
Internet
automated transfer
automated transfer
Production System
Wordprocessing client PCs transfer WP files to main system
Internal WWW Server
Wordprocessing files converted to HTML by PERL script
External WWW Server
(includes plans to make HTML Hansard available over the Internet)
Internal Firewall
External Firewall
Private (secure) Remote Access

Figure 3. Hansard on the Pilot Parliamentary Intranet

network team took the joint decision to move to Netscape as the preferred browser platform and to withdraw the *Cello* and *Mosaic* browsers. After due consideration had been given by various Committees to the implications of making electronic *Hansard* available, the service was opened up to more general access. In order to provide Parliamentary users with Netscape access, it was installed onto central file servers, but users' individual .ini files were located in their home directories: this enabled users to personalise their browsers with their own bookmarks, preferences, etc. The Firefox Novix product was already deployed to provide access to TCP/IP services for the Parliamentary Novell network and was found to work well with Netscape after some initial configuration problems were resolved.

A pilot project was initiated between *Hansard* and the Parliamentary network team to provide both online *Hansard* and a real-time bulletin board for internal use within the Parliamentary estate. Through the use of Perl scripts (a Unix scripting language), the *WordPerfect* format copy of *Hansard* was automatically turned into HTML and indexed. The electronic copy was made available to Parliamentary users from 07:00 the day following the debate: an availability artificially constrained to ensure that the electronic copy did not become available before the paper copy from HMSO. The system became available in November 1994, internally accessed via the PDVN, which all MPs and Peers have the right to access. This full text version of *Hansard* was well received within the House, with a great deal of positive feedback from MPs' offices and, in particular, their research assistants. Compared to the previous system, which offered only a BASIS index into *Hansard* proceedings, the ability to search for subjects and then to bring up the full text on-screen proved a positive business benefit. The system was introduced at negligible incremental cost as a result of layering intranet technology on top of the existing electronic *Hansard* system. Since the process of conversion from WP to HTML is automated, no additional human resources were required for this system.

Since Parliament was a *WordPerfect* word processing user prior to the advent of the Parliamentary network, *WordPerfect Office* (now known as Novell *GroupWise*) became the default e-mail facility. When the X.400 and Internet mail services were made available to Parliamentary network users, care was taken to ensure that all e-mail originated from and was received into a user's *GroupWise* mailbox. Since Netscape also included e-mail facilities as standard, it became necessary to consider how Netscape should be integrated into the existing messaging infrastructure to ensure simplified usage and avoid the complexity of multiple mailboxes. It was therefore made possible for users to send e-mail seamlessly from within Netscape, either as e-mail messages or as contributions to Usenet groups. However, the return address (*username*@parliament.uk) ensured that users would continue to receive replies in their *GroupWise* mailbox.

Additional funding has recently been applied for to develop the pilot intranet into its production phase, including improved integration with other existing systems such as those offered by the Libraries of both the House of Commons and House of Lords.

Case study: The Securities and Investments Board

The Securities and Investments Board (SIB) was established in 1985 and acquired its powers under the Financial Services Act 1986. Since then a number of developments have underlined the importance of the financial sector in the UK. There has been considerable growth in capital markets activity in the UK and an upsurge in interest by the general public in investment of various kinds. The UK financial services sector has also become ever more important as an invisible export earner. The growth of international firms active in global securities and derivatives markets has highlighted the need to improved co-ordination by regulators in different countries.

The Financial Services Act 1986 (FSA) established what was then a new and wide-ranging system of regulation and designated the SIB with the main responsibility for ensuring that this system operates effectively. The SIB does this largely by overseeing a network of organisations which carry out the frontline task of regulation, under the SIB's supervision. As overall manager of the system, the SIB must remain alert to the impact of the regulatory regime on investors and the industry. It must keep abreast of changing circumstances to ensure that regulation can evolve and adapt where necessary.

IT plays a key function within the SIB, ranging from its statutory central register of authorised individuals and organisations through to back office and general administrative facilities. The SIB utilises a range of hardware and software, ranging from Windows desktop PCs running the Lotus *Smartsuite* application set to central servers utilising RDBMS systems based on Sun Sparcstation platforms. As well as a network within its City of London headquarters, the SIB also has dedicated and dial-up links with external organisations involved in the system of financial regulation.

A project was established within the Enforcement and Legal Services Division to pilot the application of intranet technology. The Enforcement Litigation Department identified the need to capture specialist (and expensive) internal and external legal knowledge in a system that would enable a longer term return on investment from such external legal expertise. With such specialist legal advice running at hundreds of pounds per hour, encapsulating this knowledge to produce a quantifiable, searchable, long-term corporate resource would clearly be both a business and financial benefit to the SIB. The legal information on computer is an index identifying and locating relevant issues held in hard copy records. These issues comprise procedural matters, Counsel's Opinions, Court Judgments and advice on statutory interpretations in matters relating to the SIB's powers and functions under the Act.

The Legal Issues Index, as this system became known, provided a business driver for applying intranet technology within the SIB. However, prior to commencing this project, account was also taken of the wider business potential of introducing intranet technology. As well as acting as a pilot system within the Enforcement and Legal Services Division, additional objectives were established to evaluate the extent to which the intranet technology could also deliver benefits in the area of providing a single user interface (via a Web browser) to underlying systems which included Unix RDBMS and office systems. The author's experience of implementing intranets in other organisations had established the ability of the technology to provide a single user interface into a variety of underlying systems, reducing the need for a mix of proprietary software, each specific to its own application environment. The pay-back in terms of simplified user training and software support from deploying one common piece of software in place of a range of application software is one of the most tangible benefits of the successful application of an intranet.

An initial set of cases were prepared into HTML format and initially prototyped on a standalone PC running a Web server and search engine. This enabled the proposed system to be tested and evaluated in a rapid application development environment at minimal cost and commitment. Once this system had been amended in line with user feedback, a full scale Web installation (including the Verity *Topic* search engine) was installed onto an existing Sun Sparcstation platform. The existing Firefox *Novix* gateway was used to provide TCP/IP connectivity to the intranet server since the SIB is a Novell *NetWare* environment using IPX/SPX. Simplified search pages were prepared and made available to the users, enabling full text searching of the available cases. In addition, hyperlinks between relevant documents within and between the cases were also established. The first phase of roll-out was limited to the lead barrister involved. Once she was satisfied with the functionality and operability of the system, accessibility was expanded to include the colleagues within her department.

In parallel with the pilot in the Enforcement Litigation Department, additional testing and evaluation took place involving ODBC links and wider search potential to establish the extent to which the browser software could provide a single user search and retrieval interface into a variety of the SIB's systems. At the time of writing, this work is still in progress.

Additional cases were input to the Legal Issues Index using a variety of authoring methods to evaluate the most usable and functional authoring tools suitable for direct input by end-users. These ranged from *Hot Metal Pro*, through *Navigator Gold* to Vermeer's (now Microsoft's) *FrontPage*. Simple HTML authoring for end-users has in the past been the most complex facility to provide, but it is important that this function can be undertaken by general users rather than relying upon specialist authoring personnel. Improved conversion templates within word processing systems are beginning to facilitate this task and WYSIWYG dedicated authoring and publishing tools are also impacting upon this problem area. At the time of writing, *Navigator Gold* with some in-house designed user templates to simplify the authoring process, is the preferred origination route. HTML templates within Lotus *Smartsuite* are also being evaluated as an alternative means of origination.

The Legal Issues Index has been successfully implemented as an intranet and provides a valuable, cost-effective means of encapsulating specialist legal knowledge and making that easily accessible to the Enforcement Litigation Department. The system fulfils an archetypal intranet function: facilitating long-term corporate knowledge. Traditionally it has been difficult, or impossible, to capture such highly intellectual and individualised information because of its *ad-hoc* and specialist nature. The less rigid structures and open nature of intranet technology, however, provide a means of capturing such free-form data and making them searchable and retrievable. A key component in this is, however, the commitment of those involved in encapsulating their own specialist expertise: without the extensive professional commitment from the barrister concerned, the Legal Issues Index would not have been a success. Application of security features ensures that information can be restricted to as small or as wide an audience as its business owners stipulate.

Summary

Full-scale BPR is generally adopted where the element of repetition is present: that is, in environments where processes are replicable over time and demonstrate identical patterns of behaviour. Typically these environments include production, distribution logistics and finance. Patterns of working in many modern organisations are not so identifiable. *Ad-hoc*, diverse, transient and unique modes of operation frequently arise. One-time collaborative teams may be established; single-issue, short-term projects evolve. The technology underlying intranets can help support such flexible working arrangements through the provision of tools to capture *ad-hoc* knowledge and make it accessible and disseminable.

Whilst BPR typically focuses on 'mechanical' processes, blue and white collar jobs that can in large part be analysed, stratified and automated, it is the softer, *ad-hoc*, intellectual capital originated processes that intranets best support and that will deliver a real return on investment in service and knowledge based organisations. Intranets threaten hierarchical islands of power brokerage and their commensurate islands of technology. To capitalise on their potential, organisations need to design out legacy hierarchies and perceived 'threats' arising from the shared information paradigm.

Whilst intranets are attractive, and to some degree merely an extension of the concept of the networked organisation, the problems with implementing them successfully in traditional pyramid managed organisations should not be underestimated. Intranets are the most visible face of an emerging transition in technology that has the potential to revolutionise intellectual, white-collar environments in the same way that earlier automation radically altered the factory floor. Resistance to this transition is likely to be encountered from those who perceive that traditional positions are about to be undermined, both managerial and technical. It is the more fluid, faster-adapting organisations that will gain most from the competitive edge and intellectual efficiency that the flexibility of intranets can bring. And it is the large rule-bound and outdated organisations that will suffer if they do not maximise this opportunity to redesign and re-engineer their most critical business processes into truly open and flexible structures.

Information management is becoming increasingly critical as a key performance requirement in successful organisations. Nonaka[6] identified the need for organisation structures based on new assumptions: information is to be shared, not jealously compartmentalised; and information is a source of corporate knowledge as well as control. True knowledge generation requires free access to company information. Properly implemented, intranets are a step towards a practical realisation of that theoretical vision.

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Teachers' use of information technology: observations of primary school classroom practice

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Abstract

Published research indicates that teachers have not integrated information technology into their classroom practice and that computer use tends to be peripheral to other curriculum activities. However almost all of this research is based on survey methods involving self-assessment and self-reporting by teachers. Very little observational research has taken place and there is a need to corroborate survey research with classroom observations. Observations took place of 11 teachers and 253 pupils in different classes held in three London primary schools. Results generally agree with previous research in that computers are only used for a small percentage of time. Significant differences in use were observed between those classrooms where children were free to choose their own activities and those where activities where teacher directed. These differences may show that computer technology is being used only when it does not require a change of teaching style or classroom organisation. Differences were found between the youngest boys and girls in how much time they spent using computers.

Introduction

A view long held by the authors is that information technology is busy breaking down barriers between professions and as a result we should be looking more closely at what is happening in neighbouring professions. In particular the barriers between information providers are being rapidly eroded. Nicholas and Frossling[23] have already pointed to the increasing overlap in the work of journalists and information professionals. Here we propose to examine the work of another professional group who are heavily involved in information provision – teachers. Their work with IT – CD-ROM training, for instance – is propelling them ever closer to the work of information professionals: a process that is being accelerated by information professionals getting more involved in training and advisory work. There is another very good reason for looking at teachers, for we are interested in their products – the children, for they will become our users one day: how are they faring with IT, and what knowledge and experience will they be bringing with them when they arrive at the library to search the OPAC, CD-ROM and the Internet.

Enthusiasts such as Papert[24] advocating the use of computers in education have predicted far reaching and beneficial effects upon teaching and learning. However research shows that the impact on education has been far less than expected. Some studies[1, 17] suggest that computers in the 1990s have been not only peripheral to the mainstream curriculum but for much of the time they are not even switched on, especially in schools catering for the 4 to 11 age range. This would seem to be in stark contrast in what appears to be happening in the home.

Attempts to introduce technological innovations into classrooms have a long history but the failure of nearly all of these innovations to take root and flourish has a history equally long. It has been suggested that the 'resistance' to using computers should be seen in the context of teachers' general resistance to change[16]. Interestingly, information researchers on the investigation of the information needs of the social sciences (INFROSS) noted this in connection to information service use back in the 1960s (Bath University, 1971). This contrasts markedly with the world outside education – business and libraries for instance, where the fruits and benefits are highly visible. Goverments, as well as parents, want schools to produce computer literate school leavers with sufficient IT skills to gain a foothold in the increasingly computerised work place. In addition, educational reformers hope that the linking of schools to an extensive global network of computers will move schools away from a form of teaching and learning that they see as outmoded as well as counterproductive. They hope that traditional pedagogy will be replaced by new forms of higher quality learning in which the role of the teacher will be considerably changed. That is the hope, what of the reality?

Aims and objectives

The general objective of this research project was to provide observational – and more up to date –

information on the effects of introducing computers into schools. Although a lot of work has been undertaken over the last 20 years or so, virtually all of it has been based on survey methods. Results have rested heavily on self-reporting and self-assessment by the teachers concerned, and there is a drawback with this type of research for there is a tendency for respondents to over-estimate their use of computers[17]. Therefore it could well be that there is less use of computers by teachers than the research suggests. Various researchers and writers in this field have argued for more observational studies[6, 25], for when observational data are synthesised with other research approaches the result is a clearer picture and better understanding of the activities being studied.

The objective was then to observe how computer hardware and software were being, or not being, used by teachers who had no knowledge as to the purpose of the research. Primary schools were chosen because in Britain, as in many other countries, teachers in these schools are expected to teach all curriculum subjects and therefore may find that integrating information technology into a crowded curriculum is a difficult undertaking. Information Technology is one of nine specified curriculum subjects in the English National Curriculum[14] and there is a legal obligation upon primary school teachers to teach specific skills and knowledge and to assess and record children's progress in Information Technology. It is recognised in the National Curriculum that the concept of information technology can be applied to a range of technologies e.g. telephone, television, video cassette player/recorder, but there is a strong emphasis on the use of computers. There is also an expectation that computers will be used as a resource to aid learning and teaching in other areas of the curriculum.

The specific aims of the study were as follows:

1. To find out for how much time computers were being used during an average school day. In particular to discover: (a) how much of the available time they were switched on or off; (b) how much of the available time they were in use when switched on.
2. To find out if differences existed in the way that computers were used with children from different age groups and to see if this was linked to differences in teaching styles and classroom organisation. In particular, did teachers with a 'teacher centred' approach use computers less often than those with a 'child centred' approach ? 'Child centred' refers to classrooms where children have a large degree of freedom in choosing which activities to do and contrasts with 'teacher centred' which refers to classrooms where activities are assigned to children by the teacher and where there is little, and often no, opportunity for the children to make or influence decisions about what activities they do.
3. To observe how much teachers were involved with the children when they were using the computer. In particular to find out: (a) how much time they spent with the children at the computer; (b) what the purposes were for their interventions, e.g. to talk to children about their work or to sort out an operational problem etc.
4. To find out if there were any differences between girls and boys in their use of computers. There has been considerable debate and research concerning differences between girls and boys in their use of computers. In particular were there: (a) any differences in access to computers between boys and girls; (b) any differences in the way that children were grouped when using computers, i.e. single or mixed sex groups.
5. To determine whether the age of computers had any effect on how much they were used. Much of the interest in computers for educators has focused on the potential for children being able to learn more independently in an interactive, multimedia environment. This, at the very least, means having the latest high powered machines capable of using CD-ROM and being connected through the telephone network to computers located around the world – the Internet, for instance.

Scope

Observation is time and resource intensive so inevitably a study of this kind has to be limited in scope. In this case the study was limited to 11 teachers in three inner city primary schools in London. These schools were characterised by having a high proportion of children from ethnic minority communities. Many of these children spoke English only as a second language and a significant proportion were in the early stages of learning English. This may have caused the teachers taking part in this study to organise their teaching somewhat differently to their colleagues in other areas. It should therefore be borne in mind that these schools may not use computers in the same way as schools in other types of location serving different communities.

Literature review

We are living in a period of rapid technological change in which the application of computers is transforming our lives. There is much talk of the 'information age' and the 'information super highway.' Education systems across the world are under pressure to produce students who can use computers and be able take part in the new forms of commercial, social and cultural activities which are being created.

Interestingly, much of the pressure for schools to put computers into classrooms has come from agencies outside the education system, such as central government and business organisations. Central government has been motivated by the view that computer literacy is an essential tool for individuals in today's world and crucial to the nation's economic well being. The British government has sponsored many initiatives to put personal computers into schools. In 1993 the Department for Education and Science for England and Wales – the DFE – gave £30 million to local authorities to help buy computers and finance IT units, advisory teachers, teacher training and curriculum aids. In addition the DFE announced initiatives worth £7.5 million to develop educational software, new technologies and curriculum projects. According to recent government surveys[12] estimated spending on information technology in primary schools in England in 1993/94 exceeded £105 million. This is a large increase from the estimated £6 million spent in 1984/85 and has brought about a decline in the pupil : computer ratio from 107 : 1 in 84/85 to 18 : 1 in 93/94. Based on survey returns from 702 primary schools the DFE calculates that 99% of pupils in primary schools in England had hands-on experience with computers in the school year 1993/94.

In the same report the DFE states "Headteachers reported that 91% of teaching staff in primary schools felt confident in the use of information technology." If the headteachers' perceptions of their staff are true then this percentage of confident users far exceeds most previous research findings. For example two surveys of British primary teachers in 1989[11,5] found that only about 14% of them felt competent to use a range of IT applications without assistance. These two studies do pre-date the DFE report – and the explanation for the difference could possibly lie there.

Even if teachers say they feel confident in using computers, and there is plenty of evidence to suggest that they don't, they in fact only use them for a small percentage of teaching hours. The DFE[12] survey found that 56% of primary school teachers used computers at least twice a week and that the average percentage of teaching hours in which computers were used in primary schools was 21%. Collins[8] surveyed 57 serving teachers in Northern Ireland, most of whom were working in primary schools, and found that 47% of them assessed themselves as only occasional users of computers. Student teachers on placement in primary school classrooms estimated that their host teachers on average used computers for less than a quarter of the time[17].

Since computers are just one of many educational tools that a teacher has at his/her disposal it could be that teachers are actually confident and skilled in using computers but simply don't choose to use them very much. A low level of use might result from a number of different factors; for example from a lack of hardware – thus the average English primary school in 1994 had 18 children for each computer[12]. Alternatively teachers may deliberately choose other methods of teaching and learning to those offered by computers and the available software.

Many researchers and educationalists have emphasised the crucial role of appropriate and effective IT training for teachers and trainee teachers if computers are to become a major influence in classrooms. However there is another way of thinking about technological innovation in schools which emphasises the influence of the social context in deciding whether a new technology is accepted or rejected by teachers. Both Cohen[7] and Cuban[10] have suggested that any new technology introduced into schools is either adapted to traditional school structures and teaching styles or, if it is not flexible enough to be adapted, it is discarded. If a new technology demands that teachers have to change their preferred methods of teaching then quite likely it will be rejected.

It is now well understood that the challenge of integrating technology into schools and classrooms is much more human than it is technological. What's more, it is not fundamentally about helping people to operate machines. Rather, it is about helping teachers integrate these technologies into their teaching as tools of a profession that is being redefined through the incorporation process. Information technology has been seen by many people campaigning for reform, particularly in the USA, as the vehicle to transform educational systems which they perceive as rigid and emphasising only basic skills, thus favouring the learning of unconnected facts and largely excluding analytic problem solving and more complex thought processes.

Most researchers and educationalists agree that the conventional view of teaching, i.e. as the teaching of facts, is overwhelmingly dominant amongst serving teachers and firmly embedded as the dominant philosophy in educational institutions. 'The central instructional program remains much as it was 50 years ago, untouched by the technological revolution going on around it'[22]. Where the introduction of computers challenges the conventional view or demands a different style of teaching it is likely to be rejected. Likewise where the technology supports the existing view it is more likely to be incorporated (although other factors such as the number of computers available may influence the degree of use).

Becker[4] was involved with an experiment to investigate the benefits of using computers to teach mathematics. He concluded that 'teachers and schools that provide students with substantial computer experiences will implement a fairly traditional program of instruction that will not be greatly different from the curriculum that the students would have followed without the computers. This evidence supports the ideas of Fullan[16] that schools generally favour the adoption of innovations which do not require behavioral change but which promote their image of being up-to-date and efficient. Underwood[26] in summarising the results of research during the previous twenty years concludes that most schools who actually use IT do so to enhance children's performance but not to enter into new ways of thinking.

There is clearly considerable agreement amongst researchers that computers are not being used widely or effectively in many classrooms and that this picture holds true for several different countries. It appears that where computers are being used it is in ways which will not interfere with conventional teaching methods and which make as few demands on teachers as possible. It is extremely rare to find research which suggests that more than a small minority of primary school teachers fully utilise IT as one of the central tools for teaching and learning.

Differences between boys and girls in attitudes, confidence and use of computers have been extensively researched. Although in many countries there have been found quite significant differences amongst children of secondary school age (i.e. aged 11 and above) these differences have not on the whole been found amongst the younger primary school children. Becker and Sterling[3] found that in the US elementary schools in their study girls were using the computers 45% of the time. Hoyles[19] drew a similar conclusion after analysing much of the research prior to 1987. However girls may use computers as often as boys because this is deliberately organised by teachers in accordance with equal opportunities policies. However, in a situation where there is free choice of activities perhaps a different pattern of behaviour may become apparent. Eden and Hulbert[15] point out that even with equal access to computers in terms of time, differences in attitudes and confidence may still exist. They suggest that because girls in primary schools generally perform better than boys this may actually mask low levels of confidence among girls relative to boys.

What is striking about so much of this research is the great reliance placed on surveys and questionnaires. Almost all of the data in the reports has been collected by using self-report, interview and survey methods. Kay[20] points out that there is an assumption that factors which have been studied, such as attitudes, confidence, previous experience with computers, can predict the successful use of computers in education but that 'this has not been tested empirically.' He makes a strong attack on much of the research done into attitudes describing it as 'loosely structured' and 'statistically weak.' Beynon[6] was asked to contribute a critical overview of naturalistic (i.e. using direct observation) studies of microcomputers in the classroom in the United Kingdom and writes 'I was not able to do what the editors originally requested... The reason was simple there had been precious few of any quality...'.

However there have been two recent naturalistic studies, with contrasting methodologies, which have involved classroom observers. Atkinson[1] went into an English primary school and spent one day in each of three classrooms. Although she had stressed her desire to the headteacher to see an 'ordinary day' she concluded that her observations did not represent 'average or typical circumstances' but had been biased by the teachers' and headteachers' concern to show the researcher what they considered to be good practice in using computers. In other words the teachers provided what they thought the researcher wanted to see. This illustrates a major problem of naturalistic studies: the presence of the researcher/ observer may change the behaviour of those being observed. Atkinson found the computers were in use for between 33% and 48% of the total school day although she based her calculations on a very unrealistic 6/6½ hour school day.

The second piece of research avoids this observer effect neatly but suffers from other drawbacks as a result. Harrison and Hodgkinson[17], also working in England, decided to use the observations of their students who had been working as trainee teachers alongside serving teachers in a variety of primary schools. This research avoided the kind of bias experienced by Atkinson in the study examined above because neither teacher or trainee/ observer knew that observation was being conducted at the time. It was possible to collect data from a large number of classroom situations by conducting a survey of the students' observations on how the class teachers used computers in their classrooms. The main problem with this research is that the students completed the questionnaire, from which the raw data were gathered, sometimes well after they had left the classrooms and returned to college. Thus for their responses to the questionnaire were recollections from memory and not the result of direct, purposeful observations in the classroom. However the results, compiled from forty different students, are consistent with the findings of other research. Overall the students felt that computers in these schools were in use for less than 25% of the time. Asked to make judgements about the classroom teachers use of IT 45% of the students felt that their host teacher used IT 'only occasionally or not at all'.

Methodology

Observation was the preferred research method for the reasons already mentioned. Care was taken to make sure that the headteacher and participating teachers were not told the precise purposes of the study as this would almost certainly have produced a very untypical situation in the classroom during the observation periods, as happened to Atkinson.

Altogether 11 teachers agreed to let the researcher conduct observations for a period of half a day. Although the headteachers were personally known, none of the classroom teachers participating in the study were. There was presumably an element of bias in the selection of teachers taking part in that they volunteered and may therefore have felt more confident in general terms about their teaching methods and skills than those teachers who did not volunteer. An important but difficult ethical point concerns deliberately not telling the headteachers and classroom teachers in advance about the precise purposes of the research. The senior author is a practising teacher and knows from experience that if, for example, a headteacher knows that a researcher is coming to look at how computers are being used in the school then that headteacher will almost certainly select a teacher to be observed who is known to use computers well and will make sure that the computer is being used during the period of observation. Similarly a teacher who knows in advance the researcher is interested in the use of information technology is very likely to provide the kind of activities s/he thinks the observer wants to see. This is exactly what happened when Atkinson conducted her classroom observations. The purpose of the research was therefore explained to headteachers and participating teachers in very unspecific terms as being: to observe how children share information in the classroom. The relative scarcity of computer activity seen during the observations suggests that the teachers did not change their behaviour because of the presence of the observer and were unaware of the true purposes of the research.

A simple data collection sheet was prepared which allowed the researcher to note down all of the computer activities in the classroom, how long they went on for, which children took part and for how long and how much time teachers spent at the computer with the children. A record was also kept of the make and models of computers in each classroom and any special features such as CD-ROM drivers and connection via a modem to the Internet.

A close position was chosen in the classroom from which any computers in the room could be seen – there was usually not more than one – and notes were made, taking care to appear uninterested in any computer activity which took place. A record was also kept of times during the day when it would have been inappropriate or impossible for the computers to be in use such as registration periods, assemblies, games lessons etc. This was considered important so that a fair calculation of computer use could be made relative to a realistic calculation of the total available time. Atkinson[1], for example, calculated her percentages using the notional 6hr (infant) or 6½hr (junior) day which includes breaks for play and lunch. In reality the actual time available is much less than this and therefore her figures may have underestimated computer usage. By making a calculation of 'available time' as the basis for calculations it was hoped to work out a more realistic time percentage for computer use.

Results

Observations took place in three primary schools located in three different London Boroughs and altogether 11 different teachers took part. A total of 253 children aged between 3 and 10 years were covered by the study all of whom potentially had access to the computers in their classroom. The average class size in this study was 23 children. Typically the classrooms contained one computer but in two cases there were two available. This gave an average pupil : computer ratio of 17.7 : 1 which is almost exactly equal to the 18 : 1 mentioned in the DFE survey[12].

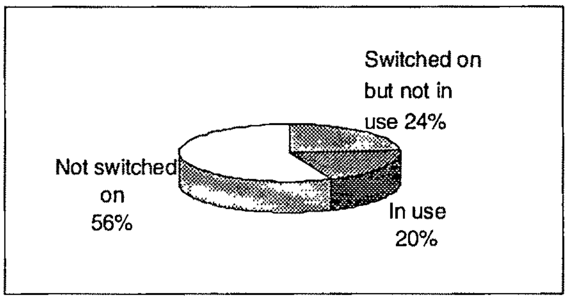
In the sections that follow the individual schools are referred to as A, B, or C and the classes by the usual British convention. Therefore A Nursery 1 signifies one of the nursery classes in school A, and C Year 6 is a Year 6 class in school C and so on.

Amount of computer use

The study was conducted over 11 half days with half of a day (i.e. a morning or an afternoon session) being spent with each teacher. School days are usually either 6 (nursery and infant classes) or 6½ (junior classes) hours long depending on the age group. However this includes two 15 minute breaks and about an hour for lunch. There is a legal minimum requirement in England of 21½ teaching hours for infants and 23½ teaching hours for juniors, which most primary schools do not exceed. The notional teaching day is therefore 4 hours 40 minutes for juniors and 4 hours 20 minutes for infants. However during a typical school day there are periods of time, such as the daily assembly, registration, sports and games lessons, storytelling sessions, when it would be impossible or inappropriate for children in the class to be using computers. Thus note was taken of such periods so that the available time in which computers could have been used was accurately recorded. The total available time during the whole study was 19 hours and 20 minutes and the calculations which follow use this total as a base line.

Figure 1 shows how computer use averaged out over all the classes in this study. It shows that computers were not switched on for just over half of the available time. During the time when computers were switched on they were being used by children for 46% of this time. This can be partly explained by understanding that in the nursery and reception classes observed IT activities were offered to the children as one of a selection of alternatives from which they were allowed to choose freely.

Figure 1. General time use of computers



Overall computers were in use for only 20% of the available time. This figure is almost exactly the same as the 21% found in the DFE survey[12], although it is impossible to make exact comparisons since it was not known what concept for the length of the school day was being used by the DFE. Averaging data can mask large variations in the patterns of use. Figure 2 shows clearly that there were wide differences between teachers in how the available time was used. In five of the classrooms the computers were never switched on during the observation period. The high percentage for C Year 3 should probably be discounted since the computer was being used against the wishes and plans of the teacher concerned – an unusually difficult pupil was involved here. If this data are ignored then the only classes which used computers were those for the very youngest children i.e. in Nursery, Reception and Year 1 classes. This can be related to differences in teaching styles and classroom organisation – and this will be examined later.

In only two cases when the computers were switched on were they used for the whole of that time. Again the result for C Year 3 should be disregarded.

Figure 2. Percentage of available time computers used

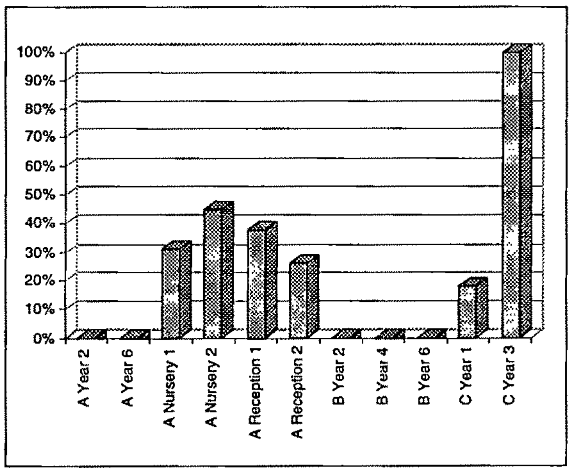
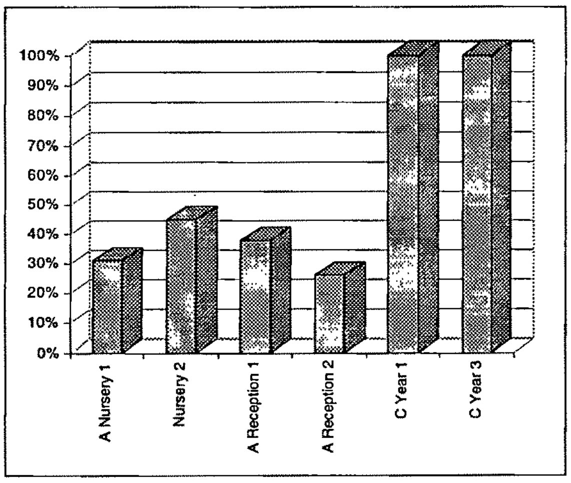


Figure 3. Percentage of available time computers used when switched on. (Note: classes which did not use computers have been excluded from this graph)



The different pattern of use in Nursery and Reception classes stand out. Although generally using computers more often than average, Nursery and Reception classes only ever used the computers for part of the time despite having them switched on – in every case – for the whole of the available time. This can be understood by being aware that the children in these classes had complete freedom to choose from a number of alternative activities. As previously mentioned this will be examined in greater detail later in this section since it is linked to differences in teaching style and classroom organisation.

Care should be taken in interpreting figure 3: the Year 1 class in school C (C Year1) appears to have a high usage of computers but in fact the computer was only switched on for 30 of the available 170 minutes.

Equipment

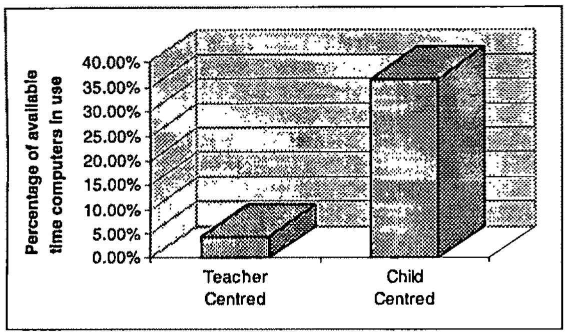
Much of the equipment was fairly old (69% 5 years or older). This was in line with the findings of the DFE survey[12] which found that about half of the computers in English schools were over 5 years old. It is interesting to see that the most powerful machines, offering the potential for using interactive software such as CD-ROM encyclopaedias, were *never* used during the observation periods, and in fact were *never* switched on. None of the 11 classrooms visited had computers connected through a modem to computers in other locations.

Older machines, and therefore older software, may be used more frequently simply because teachers have had longer to become familiar with them. The newer, more powerful multimedia machines with CD-ROM have been available for much less time, about two years, thus offering teachers fewer opportunities for training and familiarisation. As well, these machines, because they offer much more powerful tools than the older machines, perhaps require more teacher organisation and intervention and therefore may cause a greater disruption of normal classroom organisation.

Teaching style

Nursery and Reception classes, because they cater for the very youngest children in a school, are very often organised around a principle of choice linked to the idea of learning through play and this was true of the four classes in this study. In all classes observed a number of activities had been set up and the children allowed to choose freely which they would like to do. These classes have been designated as 'child centred' in figure 4 below which shows the relationship between teaching style and the way that computers are used. For older children in years 1 to 6 this large degree of freedom is usually curtailed and these classes have therefore been described as 'teacher centred'. The classes involved in this study followed this pattern exactly and in the Year 1, 2, 3, 4 and 6 classes observed all activities were teacher directed with no freedom for

Figure 4. The effect of teaching style on computer use. (It should be noted that the data from Year 3 in school C have been removed from this graph since the computer activity was chosen by children but against the teacher's wishes and plans)

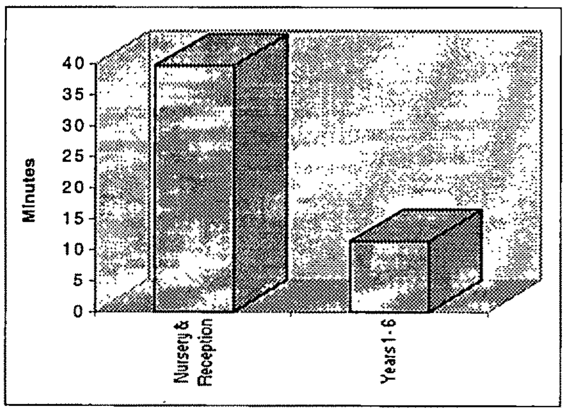


the children to choose, with the exception of C Year 3 which is discussed below.

In teacher centred classes computers were used for an average of 4.4% of the available time compared to just over 35% in the child centred nursery and reception classes. This is a huge difference.

In the nursery and reception classes the computer was routinely switched on at the beginning of the day and a program set up for the children to use if they wanted to. In all such classes observed the computers were used by some of the children at some point and the average length of time over the four classes was 39.7 mins for a half day session. This contrasts strikingly with the classes observed catering for older children where, during the 7 sessions observed, computers were used for an average of 11.4 minutes per half day session as shown in figure 5.

Figure 5. Average time computers used in a half-day session



There was one exception to the normal pattern of restricting choice in Years 1 to 6 which had a significant effect on the data. Of the 83 minutes in which computers were observed in use with these older children in teacher centred classes, 50 minutes was accounted for by one student using the computer when he was supposed to be doing a different activity with the rest of the class. The class teacher later explained that she considered him a difficult child and that in the circumstances she had decided to let him continue at the computer in order to avoid the potential disruption to the lesson, which might have happened if she had decided to confront him about his behaviour. If these 50 minutes are discounted from the figures then in the six other Year 1 – 6 classes only 33 minutes of 'planned' computer use were observed in the six half day sessions.

The differences found between 'child centred' and 'teacher centred' classrooms support the view that computers will be used if they require no change to teaching style and classroom organisation[10,7]. Computer activities fitted perfectly into the normal nursery and reception class organisation requiring no more teacher preparation or intervention than any of the other activities on offer. However where all the classroom activities were organised and specifically allocated to children by the teacher computers were hardly used at all. Although the reasons for this cannot be gleaned from this study the finding itself does support the idea that computers, perhaps because they usually operate in isolation from other class activities, do not fit easily with the widely held concept of learning being a teacher centred and teacher directed activity.

Teacher involvement

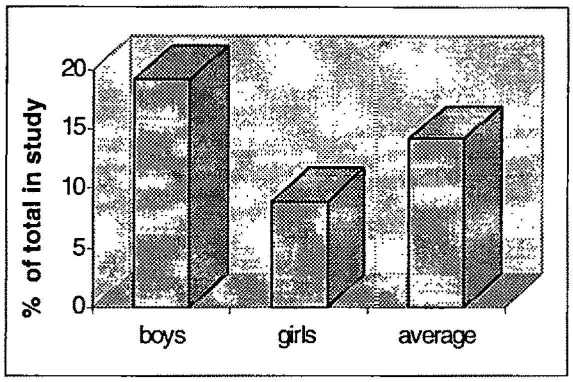
Teachers were directly involved with computer activities for 30 minutes of the total 238 minutes that computers were being used. This figure is in fact artificially high since one teacher, who was not the class teacher, intervened in A Nursery 1 under exceptional circumstances for 23 minutes because she was permanently allocated to a child with special needs. Since this child had chosen to use the computer this special needs teacher spent time helping him. Of the six other classrooms where computers were used three of the class teachers made interventions and these were all for less than three minutes each. If the exceptional 23 minutes is discounted, on the grounds that the intervention was not by the class teacher, then the total amount of time spent by class teachers with the children who were working at the computers was 7 minutes. Each one of these interventions was to sort out an operational problem and none of the teachers who intervened, with the exception of the special case already mentioned, was seen to discuss with children the content or the progress of the computer activity (teachers were simply acting as technicians).

These findings again support the idea that computers are used when they do not interfere unduly with the usual flow of events in the classroom. The lack of positive interventions concerning the progress of children's work at the computer suggests that most of the teachers were using computers in their classrooms as a peripheral activity, unrelated to other work which was going on at the same time.

Gender differences

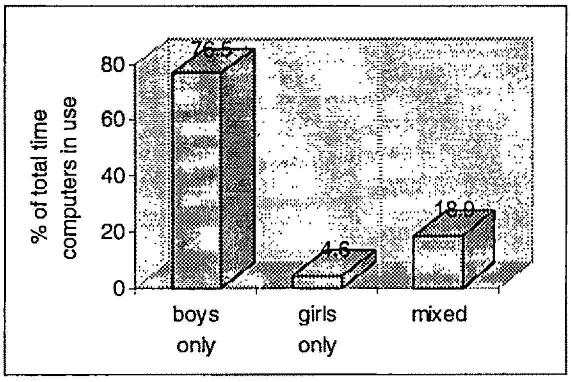
The analysis of differences in use between boys and girls was done in two different ways. Figure 6 shows what percentage of the total number of children of each gender actually used the computer during the observation periods. 19% of all the boys in the study used the computers during the observation periods, but just 10% of all the girls.

Figure 6. Number of children in a class using computer



Analysed according to the amount of time spent using the computer the differences between boys and girls are even greater (figure 7). Boys in boy-only groupings were using the computers, either singly or in larger groupings, for over twice the number of girls, 8.9% (of a total of 123), who did likewise. For 76% of the total time that computers were being used they were being used by boys only.

Figure 7. Differences in time use – by gender



These results are surprising in view of the serious commitment of all three schools to equal opportunities in line with the general education policies of central and local governments which have been in place for many years. It is clear is that when teacher control over the allocation of activities is to some degree absent then differences in computer use between girls and boys emerge, even at this very early age. This may indicate differences in attitude, confidence, knowledge and skills and could be investigated further.

Conclusions

A major consideration in all case study research is the degree to which data can be generalised. The schools and classes taking part in this research are in inner city locations and a large proportion of the children in the study came from ethnic minority families. Many of these children did not speak English as their first language. These factors will certainly have played a part in determining how the class teachers organised their teaching and the way that the curriculum was presented which may make them unlike schools and classrooms in other parts of the country.

The main aim of this research was to find out if the results of survey methods into the use of computers in primary and elementary schools could be confirmed by observations in classrooms. Within the limitations suggested above these results do support the findings of many other researchers that computers in classrooms are not being widely used and, even when in use, are not playing a major role in teaching and learning. The results also give some support to the view that teaching style is a major determinant of whether computers are used or not and that computers are more likely to be used when they fit easily into existing methods of teaching and classroom organisation. Data for 'child-centred' classrooms, where the youngest children made their own decisions about what activities to do, show large differences between girls and boys in computer use.

The last finding was surprising in terms of how large the differences found were between girls and boys in choosing to use the computers. Although this research does not attempt to investigate the underlying causes of these differences it does show that access to computers has to be organised and maintained by the teacher in order to ensure equal opportunities. Where such intervention is absent it appears that boys are using computers much more than girls. Although undesirable in terms of equal opportunities classrooms where children have unsupervised access to computers offer excellent prospects for further research into the underlying causes – attitudes, initial experiences, perceptions of computers as possessing male, female or neutral characteristics etc. – of these differences.

The potential for children in schools to be connected to the new digital version of the real world (the information superhighway) has not gone unnoticed and in turn neither has the appeal that such an idea might have to parents as voters. For example witness the recent political row caused by the Labour Party in Britain suggesting it had made an exclusive deal with British Telecom to connect every school, college, hospital and library to the Internet if it wins the next general election. Given carefully planned implementation, the right hardware and software, appropriate training delivered at the right time, and effective support services the traditional isolation of schools, teachers and classrooms could, possibly, be transformed by the introduction of a telephone line, a modem and a network of computers in each classroom connected not only to each other but to a vast, and increasing, number of computers across the world. With this equipment in place school children could interact with the huge range of people, institutions and information that this connectivity allows and use software which would offer complex learning experiences.

The tantalising question is: 'Is the electronic revolution going to transform schools or will their traditional structures and methods remain essentially unchanged?' The evidence from this research suggests that some progress has been made but that the traditional structures of institutionalised pedagogy remain firmly in place. Computers were found in every classroom although the majority of them were too old to allow connectivity to local or wide area networks. Those classrooms which had suitable computers did not have the necessary modems or telephone lines which would allow that connection to be made. However the low levels of use and the peripheral nature of computer activities observed suggest that the transformation of teaching and learning by information technology, if it is going to happen at all, has barely begun. The expectation that such a transformation would necessarily be rapid probably derives from the perception that computer technology seems to have penetrated and transformed business and commerce very quickly. However, it is worth bearing in mind that computers have been around for over half a century, the first vacuum-tube computer being built in 1942. Perhaps the IT revolution has progressed a little more slowly than at first seems apparent.

When thinking about the speed of technological innovation in schools it is worth considering the history of printing[2]. The first printing press to use moveable type was used by Gutenberg to produce, in 1455, a version of the Bible in Latin. Only after 150 years, in the early 1600s, did newspapers start to be printed regularly but eventually the printing press was an invention that changed civilisation, enabling information to be transmitted to a wide range of people and locations. This in turn created a need for wide-spread literacy and led to the establishment of many more universities, increased the specialisation of knowledge and eventually helped to create mass education in its present form. However it was not until the early 19th century that modern publishing houses were set up in larger numbers and school textbooks began to appear in quantity. So the changing of civilisation by print technology took a long time and several parallel changes had to work together before books became a defining feature of modern educational systems. In particular there had to be a desire for literacy which itself was stimulated by the widespread availability of printed material. Gaining access to print materials was the problem. Mass education in schools was the solution. In other words the problem of a widely available and cheap new information technology – books (and other printed materials) – produced a solution in the form of schools.

Applying this line of thinking to information technology in schools raises some interesting questions. What is the problem? Are computers and the new information technologies the solution or are they the problem? In general for teachers in primary schools computers are a small problem compared to the major problem of teaching the traditional curriculum to a large group of children. This and much other research shows that this small problem is usually being solved by either ignoring computers and/or using them for peripheral activities which require little supervision or involvement by the teacher. For others – politicians, parents, educational reformers, business organisations needing a skilled work force, trade unions with an interest in training and new forms of employment for their members, computer manufacturers and software developers are just some of a long list – putting computers into schools and connecting classrooms up to the world wide network is a solution.

The problem they see needing to be solved can be stated in general terms as giving children an education appropriate to the information age; a problem which has been created by the invention and dissemination of digital information technology across the globe. If information technology, like the printing press before it, is the underlying problem then are schools going to be the solution as they were previously in response to the changes in society produced by the widespread use of printing presses?

At the present moment there appears to be an unquestioned assumption that schools are going to be the solution. However there is also the beginnings of a realisation[22, 18] that the successful introduction of information technology into schools requires careful planning and the involvement of teachers in that planning. It is also clear that the ratio of computers to pupils has to be raised. There can be no significant changes to teaching and learning when there is only one computer in a classroom, just glimpses of the possibilities it can offer. However just throwing a large number of expensive and powerful computers into a classroom and connecting them up to the Internet is clearly not going to work as this and much other research shows, although present trends suggest that more and more computers are going to be put into classrooms with or without the appropriate planning.

The problems facing educational planners and administrators are inter-related and complex. It is clear that a significant proportion of any money budgeted has to be targeted at training teachers how to use information technology as a central resource for teaching and learning. Clearly the training and the supply of equipment have to be co-ordinated. Machines without training or training without a sufficient number of machines will produce the same negative result. An appropriate balance between spending on equipment and training has to be found.

There will also have to be continuous on-going support for serving teachers and opportunities for them to upgrade their skills in response to new developments in hardware and software.

Unfortunately for those favouring more information technology in schools the strong and ever present demand for teachers to deliver the traditional curriculum – 'back to basics' is a favourite phrase of many critics of the education system – together with the firmly held beliefs that teachers have about the best ways to teach that curriculum are standing firm against the changes that new information technologies might bring. The ideas of Lorton[12] throw an interesting light on the relationships between new technologies, changes in society and the education system. However what is being overlooked is that the ability to use new electronic information technologies still relies almost entirely on the 'basic' skills of literacy and numeracy. This means that the pressures on education systems to concentrate on these foundations of the traditional curriculum still remain. The problem is still gaining access to text except that now some of it comes in an electronic format but the user still has to be able to read the words and numbers displayed on the computer screen. It can therefore be argued that modern computerised information technology is as much a force for the conservation of traditional schooling as it is a force for change. The history of printing in relation to education suggests that the transformation of schools by computerised information technology may take much longer than originally thought.

From an information professional's perspective the findings of the study are possibly disappointing because there is little evidence here to indicate that a new breed of IT-literate user is in the making. However, on the one hand, it could be argued that these were after all only primary school children, but on the other hand, what better a group to start with? And for that very reason, this group has had Government money showered on it. Of course, the findings reflect poorly on the teachers, too. As a profession we should not be too complacent, but it would appear that far more technological changes have taken place in the library than in the classroom. You could imagine the chaos it would cause if computers in the library were turned on for less than half the day. Should we not expect more of primary schools in today's age?. The message that should be taken away from this study is that investment in hardware and software will come to nothing if similar investments are not made in training – and that surely is going to be the really big issue in the next decade. The fruits of technology will only be gathered if its introduction is accompanied by a fundamental re-thinking in the way we work.

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Correspondence

Sir,

As the article on veterinary information sources (*Aslib Proceedings* **48**(11/12) Nov/Dec 1996) was being published, the CONSULTANT diagnostic database and online textbook were being put on the World Wide Web at the URL *http://www.vet.cornell.edu.* It will remain free on the Web, supported by the Cornell College of Veterinary Medicine from now on.

CONSULTANT, created about 14 years ago by Dr. Maurice White and a team of IT professionals, covers approximately 6,500 diseases of eight species. It provides quick and simple access to very current quality-filtered information which has been selected with practitioners in mind. The database can be searched by sign or by disease. A search by one or two clinical signs, which can be limited by species, yields an unranked list of possible diagnoses. Clicking on a specific diagnosis provides a description of the disease with a list of references. Relevant Web sites are linked also, if available. References not in the veterinarian's personal collection can be ordered from veterinary libraries while connected to CONSULTANT (see first help screen for links). Eventually, the full text of cited references will be available when copyright issues are resolved.

Certainly CONSULTANT is not the answer every time a veterinary practitioner needs access to the literature. Searches of CAB will still be needed for case reports, other endeavours, or diseases/species not covered. But for topics covered by both databases, I have found many instances where CONSULTANT was far superior to CAB because CONSULTANT is updated so rapidly, quality filtered by a practicing veterinarian, and because it is built to be searched by veterinarians. These three features, plus sponsorship by Cornell and its direct link to libraries for copies of cited references combine to make the version of CONSULTANT free on the Web an outstanding source. Example one: I was demonstrating CONSULTANT recently to one of the most frequent CAB searchers on our faculty. He had a case of goats with abscesses, and was in the library to do a CAB ABSTRACTS search. It is a common problem in goats, and he was looking for information on treatment. We selected caprine from the CONSULTANT species list, and he told me to type in caseous lymphadenitis for the sign. This yielded one diagnosis, which we clicked on to see the disease summary and references. At the end of the list was an article by Mary Smith which he had in his personal collection, the one he was trying to remember. As he sprinted out of the library door to his office to get the article, he said that he would definitely use CONSULTANT again, as it would be much easier than CAB. Example two: within the last year or so, I was asked by a veterinary practitioner to find information on spiking mortality disease in poultry. I could find no articles in CAB. A quick search of CONSULTANT yielded a disease summary and references to several articles just published. I understand Dr. White visits the Cornell veterinary library weekly to review the new journals. He only adds to CONSULTANT references that meet his criteria for quality and usefulness in practice. New information is added very quickly.

CONSULTANT is both a diagnostic tool AND a continuously updated veterinary text. That CONSULTANT functions as an online veterinary text (when searched by diagnosis) needs to be emphasised, based on findings by Bawden and Valleley and others that veterinarians regard books as a key resource. It was used to write both editions of *Large animal internal medicine* by B.P. Smith (Mosby). See page xvii of that book for a description.

CONSULTANT more than meets the needs of most veterinary practitioners for quality, scope, cost, and ease of use. At the old dial-up price of $75.00 US for a password and manual and $12.00 US per connect hour, access to CONSULTANT was cheaper to use than purchasing one average veterinary textbook, in most locations in North America. Some of CONSULTANT's 500 dial-up users charged back for the connect time, just like any other diagnostic tool. Now for only the cost of connecting to the Web, which many vets are likely to have currently at a home computer, CONSULTANT is available for review and experimentation. CONSULTANT makes the decision to get connected to the Internet from the practice computer (not that common in the area which my library serves) an easy one. Finally, a digital source that will make an '...impact on the work of the veterinary practitioner...' that Bawden and Valleley anticipated.

Ann Viera,
Veterinary Librarian,
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MANAGEMENT INFORMATION SYSTEMS IN NIGERIAN UNIVERSITIES

Richard Olorunsola

HEALTH INFORMATION PROVISION IN MEN AND WOMEN'S MAGAZINES

Sophie-Charlotte Graham, David Bawden
and David Nicholas

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Aslib Proceedings, vol.49, no.5, May 1997. pp.109-148

Editorial

We have two very different views of information in this month's issue. Both can be said to use the same ad hoc definition of information as being data presented in such a way as to inform. 'Inform' in this sense must relate to the process of having one's understanding of a topic enhanced by the data.

Richard Olorunsola's paper on the implementation of nascent MIS in Nigerian universities points up one of the besetting ills of information systems everywhere: that they are so often designed to handle the data that are available, rather than to call for the data that will really aid understanding.

Library management systems are particularly prone to the collection of this sort of pointless data. Everything countable is counted, whether or not it is relevant or meaningful, and then reported back as an undigested porridge of numbers. Understanding is swamped by mere numbers. The metaphors are becoming mixed but the message should be clear. Just reporting the (easily) countable numbers resulting from transactions is not the same as providing an understanding of why those transactions take place.

In the case of the MIS it is shown that the system described can count the numbers of students, the courses they are on, and the marks they get in examinations. What the numbers (and the system) cannot tell is why the student numbers are at the particular level, why certain courses are favoured and others are not, and why course marks have the values they do and are spread across candidates in particular ways. External information, including socio-economic and demographic data, are required to transform the numbers in to genuine information. An MIS that cannot deliver that information is not an MIS: one might as well do the job with pencil and paper.

In the case of the paper on health information provision, a different sort of picture emerges. Here we have a study of six high-quality up-market men's and women's magazines, examined in terms of how they address health issues. The study has dissected the specimens in every possible way to produce results that appear to have come as a surprise to the editors of the magazines concerned. The editors are not identified by magazine title, which is understandable although unfortunate. A little intelligent reading of the paper may lead to fairly accurate guesses as to who is speaking for which magazine.

This paper looks at the provision of information from the point of view of the consumer. It is quite clear, and drawn out explicitly, that the editors do not really understand that for many readers their magazines are a major (sometimes the only) source of information on health care. That places a tremendous responsibility on the magazines to be accurate, fair, complete and helpful. This collection of duties sits uncomfortably on the shoulders of editors whose papers are supported by advertisers; who are not themselves possessed of any particular scientific of medical training; and whose principal concern is to build and maintain circulation figures. Thus their MIS would measure the circulation of their titles versus those of their competitors. Arguably, in relation to health care, they ought to be measuring the likelihood of their readers surviving intact from one issue to the next.

This is a problem with which many magazines in the DIY and hobbyist area have had to grapple for some years. Magazines that publish technical advice are vulnerable to lawsuits from those who follow the advice and find themselves in trouble. The standard way of avoiding this situation is to publish either a general or a specific disclaimer that neither the publishers nor their agents or contributors can be held liable for the outcome of any particular piece of advice being followed. In other words, if a magazine publishes a technical tip on how to repair a car and omits to tell the reader how to secure the vehicle before removing one or more of its wheels, then the disclaimer should cover the editor, publishers and author against the actions of the more creative amateur mechanic. Exactly the same situation obtains with regard to financial and investment information.

Perhaps magazines that print articles on health care should consider the wider context of information provision. It is not only about building circulation. They are disseminating information, and that information is clearly taken as advice by a great many readers.

Peter Gillman
Editor

Management information systems in Nigerian universities

Richard Olorunsola
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Abstract

The paper discusses the objectives, implementation and the limitations of MIS in Nigerian Universities, using the University of Ilorin as an example. It examines the problems of developing an efficient and effective MIS in Nigerian Universities. Inadequate collection of data from students and staff and lack of cooperation from people concerned with the processing of data forms for the MIS form part of the major problems. The conclusions include suggestions for more information on student and staff, and external data that can be useful in strategic decision-making.

Introduction

Debons and Montgomery[1] simply define management information system (MIS) as a set of formalized rules and procedures designed and maintained and used by people with the help of information processing technology for the purpose of providing information to fulfil management needs. The system provides for decision-making by gathering and organising data. A management information system is therefore a single source from which the manager can obtain specific information. It can further be described as a collection, storage and presentation system.

Examples of attention to management information within the university environment are largely confined to the United States. For example, Freeman and Simpson[2] described the development of a unified evaluation, budgeting and planning system at Michigan University, which concentrates mainly on collection of internal data to enable budgetary allocations to be made in a more efficient manner. However, little attention is paid to specific needs of individual manager. In a report of the development of an Information Center for Chicago State, Governors State and Northeastern Illinois Universities, there was dissatisfaction with the current system, a large number of requests of users could not be met with the existing system. Little is said in the paper about the information content of the University data or of the management issues determining users needs.[3]

There is also an absence of consideration of information requirements in Penrod and Dolence's [4] account of the development of Information Resource Management at California State University. The report concentrates on personnel, on reporting structures and on technological infrastructures. Pellow and Wilson[5] examined the problems of developing management information systems in universities, with particular attention to the information needs of heads of departments. The article explored the content of university work, and needs were uncovered using critical success factors methodology. The advantages of the method are that all information is considered, whether or not it is easy to collect, and the critical success factors point to priorities for development.

This article attempts to review, very briefly the literature, and to examine the implementation of the MIS at the local level (University of Ilorin). It examines the level of activities at the MIS office and the limitation of the system in the provision of information. It is also concerned with the issue of external data for the MIS and the determination of the specific information needs of head of departments in order to input such information onto the computer.

University and Information

Farrant[6] has correctly noted what universities do with information: to create, to interpret, store and transmit knowledge. All this comprises the greater part of their function. He went further to identify the categories of decision takers and managers who should be using information, they include:

1. Executive heads of institutions who are full time in the service of the institutions, with their careers in teaching and research.
2. Academic officers, such as Pro-Vice-Chancellor, and heads of department.
3. Career administrators who are full time and permanent.
4. Service managers who are full time and permanent with specific disciplinary training not unique to higher education, such as librarians, computer personnel, accountants, catering officers and engineers.

Background

The history of MIS in Nigerian Universities is a recent one. There was a joint conference between the National Universities (NUC) and the British Council in 1987 which gave birth to the idea of Management Information System (MIS). The intro duction of MIS was recommended as a result of the difficulties encountered, not only in data collection but processing and storage in Nigerian universities. The need for a modern data approach to university management practices was also felt. In pursuance of the above, four pilot universities were selected for the pilot project, namely the Universities of Ilorin, Lagos, Nigeria (Nsukka) and the Federal University of Technology Minna.[7]

The MIS project took off officially in December, 1989 with a workshop for academic planners and Bursars of Nigerian universities. Two working groups were set up to accomplish the task of identifying the data elements for the proposed MIS project. These were the student and staff Records Working Group and the Finance Working Group. This event was followed in 1990 by a Technical Committee on software design and development which was to convert the work done by the working groups to a system report for implementation by a team of selected programmers from the four pilot universities. The software used by the MIS in the universities was locally developed under the guidance of the NUC. The application has since been installed in the pilot universities.

Objectives of the MIS

The NUC states the objectives as follows:

1. to standardise the system of obtaining reports and statistical information from the various universities on student, staff, library and financial matters.
2. to record such information on diskettes or tapes at the user universities and send the diskettes or tapes to the NUC for information storage, analysis and retrieval purposes.
3. to ensure that such information is accurate and timely.
4. to organise information for planning, budgeting and decision-making.
5. to help the universities put in place an effective management system and to improve the utilization of resources.[9]

If the laid down objectives are pursued, management information systems can be used in the universities to identify issues and provide necessary input.

Implementation of the MIS at the University of Ilorin

A new unit designated as Management Information System (MIS) in the office of the Vice Chancellor was carved out to carry out the activities of the MIS. The activities of the unit with nine staff is supervised by a committee that is similar to a management board.

The facilities available at the MIS office at the moment are three computers and two printers. The activities summarized here form the bulk of what goes on at the unit. Full information on the type of data required for the MIS is contained in the MIS information Bulletin issued by the unit.[8]

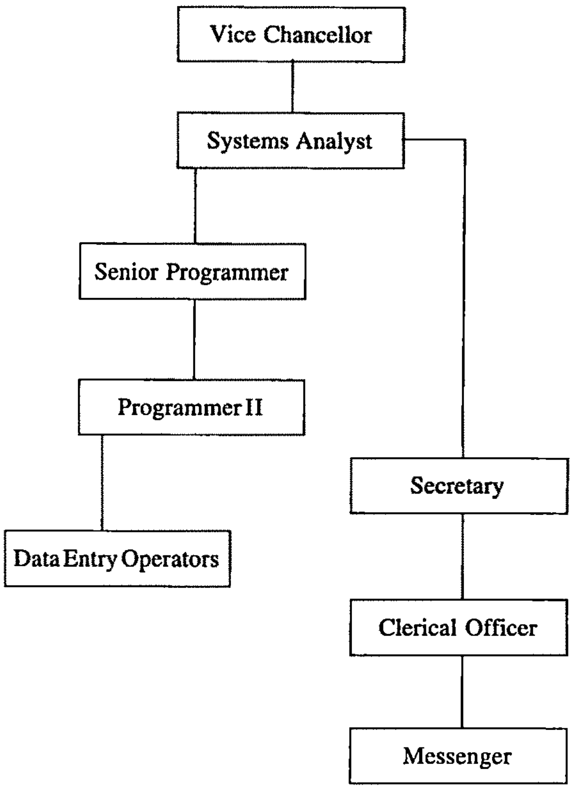

Table 1. The organizational chart of MIS unit at the University of Ilorin.

Personal data forms

Forms were designed as appropriate to capture student, and staff data. The information provided on the forms includes name, address, course, date of birth, age and other demographic information. It is observed that vital information or data that border on the social and occupational characteristics of students are not provided. For example provision is not made for details of work experience for the part time students. These are just the kinds of information that are needed to provide a factual input to current issues in education policy and planning, and which educational institutions may be called upon to provide. On the socio-economic background of students, such vital data on occupation of the parent or guardian of applicants that can give the distribution of social class of university students are not provided for.

Generally on data forms made available to both staff and students, there have been a number of problems – in most cases exact information was not provided. There were omissions of file numbers without which entry cannot be made. There are a few problems in the publication section e.g. whether it is a journal or book, and if already published or only just accepted for publication, has not been developed. This is essential as reports regarding publications are classified by category and status. This also applies to the entry under research in progress.

On student personal data forms, most of the forms completed were not correctly filled out. Such information as registration number or types of programmes being pursued or the highest entry qualification obtained were missed out. Such are the present problems encountered at the MIS office. When the system is fully operational it should be possible to provide student information and course lists. Statistical information or data for library and financial purposes have been excluded from the MIS. In fact, programmes were not written for them. The plan is for the bursary to set up its own system to standardise the method of obtaining reports and data. Presently the MIS is designed to capture only internal data or information.

Training needs

The need for training is clear in this type of situation. As a result training has been provided for several officers connected with the MIS – ranging from the chairman of MIS, Head of the MIS unit and technologist to programmers. The duration of the course ranges from 3-6 months – most of which is held overseas. Further training needs have been identified not only for staff but for users of the system.

Limitations of the MIS

A management information system should capture data or information not from internal sources alone but from external organizations. The MIS at the university is limited to internal sources. External data will assist in guiding and supporting rapid and effective decision-making. Such data can be obtained from similar institutions, and different sectors both locally and nationally. For example, through administrative procedures at the national level, publications as Joint Admissions Matriculation Board (JAMB) reports, statistical bulletins, block grant allocations and public expenditure are published. Also regular sample surveys e.g. general household surveys, social and community planning research, attitudes surveys and labour force surveys are useful sources of external data. Special or ad hoc surveys such as Commissions of Enquiry and Research Reports will provide excellent information useful in the university education decision-making process.

The limitation of statistical data of the MIS in this respect will be overcome when data are captured from the various external sources discussed above. The data can assist resource allocation between and within universities, projections of student members, course management and description of the characteristics of the student body. There has been a recognition of the importance external or exogenous information for strategic decision-making.[10, 11]

Similarly, the MIS has not paid attention to the specific needs of departments heads who may be seen as part of university administrative team. It is necessary to query the total information needs of the heads of departments.

The present approach to information or data capture has not assisted in the speedy processing of input data. Sending student and staff data forms from faculty offices and the personnel department is a factor that affects the smooth flow of work into the MIS office. The limitation imposed on this processing approach can be remedied by having computer terminals connected together to form a computer network. This will permit the local processing of data within a given department on the minicomputer, and also allows data required for the MIS to be sent into a large host computer.

Conclusions and suggestions

It is depressing to note that in the past years the assembly and the use of information on university education for internal management was not seen as important. It was the late 1980s that heralded the coming of MIS into the Nigerian university system.

Some specific points have emerged from this article, particularly from the implementation and limitation parts. The study has revealed the importance of external data in decision-making in universities. Problems have arisen at the MIS office from improper or inaccurate completion of personal data forms. Also the attitude of people or staff handling the forms at different departments before passing them to the MIS unit has not been encouraging. The study revealed that the needs of heads of departments as it relates to information has not been considered in the MIS.

From the above it is suggested that the needs of the departments and their links with organization and people external to them in their research activities be given a favourable consideration. This is important as Pellow and Wilson rightly observed that 'strategic planning has the fundamental aim of achieving an alignment between an external environment and the internal capabilities of the organization'.[12] The provision of social, demographic and education data for university education management will provide an opportunity to greatly improve upon the provision of information in these areas both for internal management purposes.

It is important to consider a good deal of information held in the filing cabinets of educational administrators and course coordinators for onward transfer to the MIS unit. When examination records are put into computer files, it would facilitate the monitoring of performance. In fact, what is needed in Nigerian universities is management information systems that are sufficiently robust and flexible to aid university administrators, heads of departments, engineers, and accountants with varying cognitive styles in making decisions which vary widely in type and make up. The future of any university as an organization depends not only the use made of its money, materials and people but also on the use it makes of information.

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Health information provision in men and women's magazines

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Abstract

The purpose of this research was to investigate the nature of the coverage of health issues in magazines, and specifically to compare the coverage in men's and women's magazines

Content analysis was used to examine the health information in the six upmarket magazines (Cosmopolitan, Elle, Esquire, GQ, Marie-Claire, and Maxim) selected for the study, with a wide range of criteria used to analyse the health information contained in them. Interviews with four of the health editors from the sample were conducted in order to elucidate some of the main findings.

Unexpectedly, the differences in health information coverage are greater between the individual magazines than between the total women's and men's groups. Overall, men's magazines appear to treat health information in a more informative manner than women's, although both groups provide unusually high levels of information required to change their readers health behaviour.

With this level of information provision it is noteworthy that many of these magazines have no clear health information policy, and that their editors have no qualifications or training in either health or science.

1. Introduction and literature review

1.1 Health definitions

In order to study health coverage in magazines, books or newspapers, it is necessary to form a definition of health.

The Micropedia Britannica[1] devotes almost a whole page to the definition of health. It defines health in human beings as: 'The extent of an individual's continuing physical, emotional, mental, and social ability to cope with his environment'. The Micropedia elaborates further by stating that 'bad health can be defined as the presence of disease, good health as its absence'.

However, the Longmans dictionary[2] defines health in two ways: '(a) The condition of being sound in body, mind or spirit especially freedom from disease or pain. (b) The general condition of the body'. On the other hand, the Concise Oxford Dictionary[3] defines health as being either 'Soundness of body or condition of body'. The Concise Oxford does not include emotional or social abilities as being part of health.

These examples illustrate the difficulties in defining the concept of human health and setting clear limits to it. Some define health as being only a physical condition, yet others, include mental and emotional states in their definitions.

It is possible to view health as a combination of these three definitions. Health in humans should primarily be a physical condition affecting the body. However, it is clear that emotional, mental, and social well-being can also have a role to play in health. These aspects will be included in this definition in so far as they can have a demonstrable impact on the physical condition of the human body.

For example, the emotional state of being happy has been shown to contribute to the release of endorphin hormones in the brain, which in turn seems to affect the immune system of the body. Therefore, for the purposes of this study, the Micropedia's more complete and complex definition was adopted.

1.2 Health education and the media

There are a number of studies which show that the media play a vital and influential role in health education and behaviour. In fact: '...by virtue of attracting such large audiences, the mass media are a primary source of information and influence regarding public understanding of social and political structures and processes'[4]. The mass media, that is to say the television, radio, newspapers (tabloid and quality), and magazines, are important players in health education. Their portrayal of health issues influences the behaviour and attitudes of their readers towards health.

'People actively interpret what they see and hear, they select, reject, make judgements and discuss issues raised by the media'[4]. Studies have shown that the media affect the public in different ways[5,6]. However, it appears that in general, the mass media 'often present contradictory images which are not supportive to health-enhancing behaviour... and oversimplify complex and controversial issues'[4].

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1.3 Health and the news

Several studies have attempted to determine the influence of health information in the news[7,8,9,10]. The first of these studies examined the perceived reliability of sources of health information, and divided the possible sources into three groups: 'formal, e.g. GPs; informal, e.g. friends; and commercial and media sources, e.g. newspapers'[7]. The principal finding of this New Zealand study was that the 'mass media should only be utilised in supportive roles to back up the promotion activities of health professionals and others'[7].

In an effort to measure the quality of health information in the press, a Canadian study[8], devised an index of scientific quality. Another Canadian paper[9], described how health and medical professionals should guide patients towards using the media as a source of health information, in conjunction with their own advice.

A further paper, written for the US scientific establishment, explored how lay journalists work[10]. This paper undertook to clarify the environment in which scientific news is generated and written, by interviewing numerous scientific journalists. It also makes a number of valuable recommendations, the most salient of which, are, that firstly, 'Information should be organised in a way which illuminates the available choices and permits individuals to reach informed judgements'. Secondly, that health and science information should be reported as clearly and objectively as possible.

These studies illustrate the importance of the media, and in particular, the print media, in disseminating health information to the general public.

1.3.1 Traditional criteria of newsworthiness

The print media have a long tradition of assigning criteria of newsworthiness to information, to determine the value of the information that will be printed by them. Several books have been written on this subject[5, 11, 12], but the 'traditional' newsworthiness criteria for information, can be summarised as follows:

- The information should be based on existing concerns or an event.
- The information should be human interest, or feature prominent people or celebrities.
- There should be surprise and wonder, conflict, controversy and contest.
- It should be in geographic proximity to its readers.
- It should involve danger, suspense, and adventure.
- It should be negative.

Finally, the timing of the information and the space left in the newspaper or magazine are also important factors in determining what information will be printed or even written about.

In fact landmark studies by Kristiansen and Harding[13,14] have explored whether British newspapers apply these traditional criteria to the reporting of health issues.

1.3.2 Previous Studies

On the whole, most previous studies of health information in the print media are limited to two types: newspapers and magazines.

1.3.2.1 Newspapers

The predominant area of study seems to be in examining health information in newspapers be they quality or tabloid.

The most authoritative of these studies is only as recent as 1984[13], and was repeated in 1988 by the same researchers[14]. The main conclusion of these studies was that articles in newspapers 'originated from daily events and described the health issue superficially'.

Other newspaper studies are presented as Master's theses [15,16] and have used the same or similar methodologies as Kristiansen and Harding. These more recent studies arrive at similar conclusions: that health information is manipulated by newspapers to fit the traditional criteria of newsworthiness.

1.3.2.2 Magazines

Previous studies of health information are less frequently conducted in magazines as they are in newspapers. Indeed, the whole area of magazines has been studied relatively, while health information studies in magazines seem to be limited to those aimed at women.

Moreover, research into women's magazines is principally with reference to US publications[17,18,19]. Amanda Amos appears to be the only researcher who has focused on British and European magazines[20,21].

In general, research into health information in women's magazines focuses predominantly on the effects of advertising[22], and specifically tobacco advertising[17, 20, 21, 23]. Other studies focus either on more specific aspects of health information, such as nutrition[18], or on analysis of a sample of weekly magazines[24] . The only study which attempted to examine health information in a similar manner to newspapers is another MSc thesis[25]; however, this study was limited to five magazines published by the same company and studied over three months. The main conclusions of this study were that women's magazines were a large source of health information, and in general, despite certain imbalances a wide range of topics were covered, and provided a positive picture of health.

As yet, therefore, there would seem to be no full study of health information in either women or men's magazines.

1.4 Magazines

1.4.1 The value of magazines

There are two main reasons why magazines should be studied in more detail to assess their treatment of health information. The first, as we have seen in section [1.3.2.2], is that it is an area in which very little has been previously examined. The second, is that magazines are an important source, if not the most important, of health information for the general public.

A recent study by the Office of Health Economics[26] found that in both men and women aged between 15 and 65+, magazines and newspapers were the main source of health information (39%), with GPs a close second (38%). In particular, 42% of the social class AB were more likely to modify their health behaviour as a direct result of using magazines (and newspapers). Indeed, 49% of AB's used magazines as their main source of health information, as opposed to 38% of classes C1C2, and 37% of social classes DE.

This study is supported by the latest National Readership Survey figures for 1995, where 50.2% of all adults are interested in health and fitness in magazines 27. Television programmes were the topic of most interest, with health coming fourth out of a possible 25 topics.

Clearly, health is an important and worthwhile issue that the general public is interested in, and magazines are the principal choice of source for obtaining this information.

1.4.2 Overview of the history of magazines

The history of women's magazines has been extensively documented e.g. [28, 29, 30, 31]. Men's magazines, however, are still a relatively recent phenomenon, and little has been written to document their rise.

1.4.2.1 Women's magazines

The Ladies' Mercury was published in 1693, and is recorded as being the first women's magazine. However, The Lady, first published in 1885, is the oldest surviving magazine still published today[28,29]; a notable feat, considering the thousands of magazines which have been launched and failed.

These first pioneering magazines generally covered topics such as: fashion, dressmaking, domestic duty, letters, etiquette, cookery and gardening; and were aimed at the upper classes[28].

The first appearances of health issues in magazines came in 1852 when Samuel Beeton published The Englishwoman's Domestic Magazine at twopence a copy, aimed at the middle to working classes. This magazine included topics such as gardening, fiction, fashion and articles on personal hygiene[29].

The first magazine dedicated to health was published in 1902, and called The Woman's Health and Beauty Magazine. This magazine was launched under a male editor and had the explicit aim of encouraging healthy living, physical culture and beauty[29]. It ran for 18 years, before folding in the 1920s.

From the turn of the century, women's social and political status was increasing and women's magazines proliferated, satisfying women's need for information. Health became a principal topic in all these new magazines, and in the 1950s, weekly magazines also started to cover health issues[29].

In fact, in the last decade or so, health issues have been taking over increasing amounts of space in women's magazines, so much so, that specific health magazines are being launched all the time, the most recent additions being Top Sante, Zest, and Marie-Claire Health and Beauty.

Indeed: 'health and fitness have always been subjects dear to women's magazines. Sometimes beauty is part of the editorial package, but the whole gamut of slimming, exercise and medical advice is meat and drink to the editors'[29].

Furthermore, health, sex, psychology and slimming are among the most frequently covered topics in top selling women's magazines[31]. A keynote report remarks that: 'Over the last forty years the role of women in British society has undergone enormous change, but the whole concept of women's magazines has remained remarkably intact. Whereas men have traditionally bought magazines that are based on a particular interest, or activity..., women are still expected by publishers to have a set of interests peculiar to their gender. So entrenched and successful has this formula become that it has now spread to the field of publishing for men, e.g. Arena, Q and GQ'[31].

1.4.2.2 Men's magazines

In general, when men's magazines are mentioned, one tends to think of either the pornographic top shelf variety or the hobby and activity magazines. Undoubtedly, one could say that men's magazines function in the opposite way to women's. Whereas women's magazines are specialist periodicals interested in a general audience of women, men's magazines have tended towards being focused at particular groups of males and cater for separate parts of their lives[30].

There have been, until recently, few if any magazines that catered for men or their male roles. GQ (Gentleman's Quarterly) launched in 1989, and Esquire, launched in 1991, have been the market leaders in general men's magazines.

Magazine publishing in general has always been a very large industry sector and the turnover of new/old magazines is high[29]. Indeed, men's magazines have recently been the largest growing sector of magazines overall, and now sell about 500,000 copies a month[32].

However, the content of these magazines has changed slightly over their short lives. Initially, GQ and Esquire focused on topics traditionally found in women's magazines, such as fashion, style, grooming and problem pages[33]. Since 1994, new magazines, such as Maxim, FHM (For Him Magazine), and Loaded have centred on health, work, exercise and sports, and of course, women[33].

Since the arrival of these new titles, many articles have been written about them in relation to women's magazines[34,35,36]. Some have even remarked upon how both men and women's magazines appear to concentrate on methods of satisfying men's needs[36,37]. In fact, one journalist states that: 'men and women's magazines differ from one another in that women's magazines tend to focus on improving relationships with men while men's centre on improving sex'[37].

Furthermore, the health market alone is increasing at some speed and publishers are responding to this by escalating the number of books and magazines dealing with health[38]. Magazines recently launched in the UK as a response to this demand include Men's Health, and GQ Active. In the US, Men's Health boasts 1.3 Million circulation[38], and the UK edition is also doing well.

Men's magazines in general, and health in particular, are therefore very topical areas of interest.

1.4.2.3 Upmarket magazines

Magazines in general can be divided into two categories: 'upmarket' and 'downmarket'. 'Upmarket' magazines are usually glossy monthly titles aimed at young professionals with disposable incomes and of social class AB. 'Downmarket' magazines are usually weeklies aimed at lower middle to working classes of CDE groups. There are several reasons why upmarket and not downmarket magazines were chosen for this study.

The first is that there are no real male equivalents to women's weeklies such as Woman's Own, Bella or Best. General men's magazines, when they exist at all, tend to be in the upmarket category, and therefore provide better comparison to women's magazines in the same socio-economic bracket.

Secondly, upmarket magazines always have health sections and provide more detailed information than weeklies. In addition, upmarket magazines are aimed at an educated audience and are used by this audience as a main source of health information (see section 1.4.1).

Finally, upmarket magazines have not been comprehensively studied for their coverage of health information, and in the case of men's magazines there appears to have been no research at all.

Purely health magazines, such as Zest or GQ Active were excluded from the study for two reasons. The first is that they would not necessarily be considered upmarket as many are not monthlies, just bi-annual. Secondly, these publications are too recent and too erratic to study over a period of time. Perhaps when these publications have stabilised they too could be analysed for their health information.

1.4.2.4 Choice of magazines

The magazines chosen for this study were selected in such a way as to give a representative view of the market, and were studied over one year of publication.

Of the men's titles, GQ and Esquire were selected because they are the current market leaders, with the highest circulation figures. Maxim was chosen as it is a relatively new title, launched in 1995, and is part of the new breed of men's magazines.

Of the women's titles the choices were more difficult, but Marie-Claire (launched in 1988), Cosmopolitan (launched in 1972), and Elle (launched in 1985) were selected. Full details of the sampling process are given in the Methodology section 2.2.

2. Methodology

2.1 Content analysis

The principal method used in this study, to examine the health information contained in men and women's magazines, is content analysis.

Content analysis is a widely recognised and used method for making deductions from printed material. It has been defined as 'a research technique for making replicable and valid inferences from data in their context' [39] and also as 'a research methodology that utilises a set of procedures to make valid inferences from text' [40].

The technique of content analysis has been shown to have several advantages: 'it is unobtrusive, it accepts unstructured material, it is context sensitive and can cope with large volumes of data' [39]. Furthermore, content analysis is a technique that has been extensively used in previous studies of this kind [13,14,25,41,45]. These advantages made content analysis the preferred methodology for this study.

2.2. The sample

There were several reasons which influenced the choice of the magazines in this study sample, some of which are given in sections 1.4.2.3 and 1.4.2.4.

In the time available for the study, it was decided that three upmarket men's magazines and three upmarket women's magazines would be studied over one year from July 1995 to June 1996 inclusive, thereby giving a total of 72 issues to be studied. Monthly magazines do have seasonal variations, and the only way to minimise bias was to study them over one year.

All six magazines had to contain health sections and in all cases, the British editions of the magazines were studied. Full details of the sampling process, and background details on the magazines, are given by Graham[44].

2.3 Procedures

A pilot study was conducted using two magazines, Maxim and Marie-Claire, in order to test the usability and relevance of the categories in the criteria sheet. Only one issue of each magazine was used, this being the most recent issue available at the time.

In all cases the contents page was scanned to identify health or health-related articles from the headlines. If this was not at first clear, the article was then read to establish its health content. The contents pages were scanned twice in order to minimise the possibility of omitting health or health-related articles.

A criteria sheet was drawn up in order to record all information in a standardised format, and a relational database was created using the Access database package in order to process all the data collected from the recording sheets. The database was then queried to obtain all the results.

Full details of the results are given in section 3, and their discussion in section 4.

Once the results were obtained, letters requesting short interviews were sent to the health editors of all six magazines in the sample; four agreed to be interviewed, two each from women's and men's magazines. Three of the interviews were conducted in person, and notes were made at the time. However, due to the editor's work pressures, the fourth interview was conducted over the telephone.

The interviews lasted 30 minutes, and are reported (anonymously) in section 3.4, and discussed in section 4.

2.4 Subject boundaries

2.4.1 Definition of categories

As seen in the introduction (section 1.1), health is very difficult to define and set boundaries to in a categorical way.

However, for the purposes of this study the health categories were modelled from the only known previous studies in the field[13,16,25], and modified accordingly (see section 1.3.2).

The final 26 health categories are as follows:

Addictions
Ageing
Alternative medicine
Birth control
Carers
Childcare
Class inequalities
Death/ Euthanasia
Diets
Disabilities
Diseases
Environmental influences on health
Exercise and fitness
Gynaecology (female)
Medical advances/ research
Medical incompetence/ negligence
Mental health
NHS
Obstetrics
Prevention
Private medicine
Self-help
Sex, sexuality & health
Skincare
Urology-genitary (male)
Other

2.4.2 Topics and articles excluded from the study

a) Beauty articles not directly related to health were not included.

b) NHS articles normally coded as Favourable, Neutral or Unfavourable by [13] study, were only coded as occurring or not.

c) The child abuse category from the [16,25] studies was excluded, and better coded under mental health.

d) The unemployed, homeless and ethnic minority category from [13] was not included as the magazines in this study were all upmarket and would not be likely to discuss these concerns. Furthermore, it was thought that this could be categorised in the class inequalities field.

e) Evaluation of the measure of success of the treatment described for the diseases category[2.5.3.11] was not included.

f) Overall, articles which did not explicitly mention or refer to health were not included in the study.

2.5 Information recorded

2.5.1 General Information

In all cases the magazine name and month of issue were recorded. All the magazines were measured for page size and all had very similar full page type areas[44]. This enabled a standard picture of the percentage of health pages in each magazine to be defined. In order to do this the total number of pages in each issue was recorded, and the total number of health and health-related pages was also noted.

2.5.2 Description of articles

- The title of each article or item was recorded.
- The sex of the author was also recorded in order to see if gender caused a bias in writing style.
- The type of article was recorded as one of the following: News, Column, Feature, Personality/ Interview, Interpretative/ Opinion/ Debate, Other.
- In order to see how health oriented the articles were, the focus of each was recorded. Focus was recorded as being either 25% or more of the article on health, or just a reference to health.
- Finally, the self-named magazine sections in which the health articles appeared was recorded as being either in their health section or not.

2.5.3 Health categories

All articles or items were coded with at least one health category, and in some cases, were assigned a second or even third health category. However, no article was coded twice for the same category.

2.5.3.1 Addictions or issues of self-control

Articles reporting addictions included topics such as alcohol, tobacco, glue/ solvent abuse, addictive problems of medicinal drugs, illegal drugs, and eating disorders.

Compulsive eating disorders were also recorded under mental health and diets.

2.5.3.2 Ageing

This category was introduced for articles discussing ageing and health. Ageing treatments such as cosmetic surgery were only included if directly related to health.

2.5.3.3 Alternative medicine

Articles reporting topics such as aromatherapy, Chinese medicine or complementary therapies were recorded here.

2.5.3.4 Birth control

This category included contraception and induced abortion. Infertility problems were recorded under obstetrics.

2.5.3.5 Carers

This included people looking after a sick or disabled relative at home.

2.5.3.6 Childcare

Articles discussing child development and health, or childhood illnesses were recorded here.

2.5.3.7 Class inequalities

Articles describing poverty or social status linked to health issues were recorded in this category.

2.5.3.8 Death/ Euthanasia

Articles dealing with death or bereavement were included here.

2.5.3.9 Diets

Food safety, nutritional recommendations, healthy recipes and slimming were included here.

Compulsive eating disorders were recorded here as well as in the mental health, and addictions categories, as appropriate.

2.5.3.10 Disabilities

Articles concerning mental or physical disabilities were recorded here. General mental health issues were recorded in a separate category.

2.5 3.11 Diseases

Articles about diseases were further assessed for provision of helpful information:

- A cause was mentioned
- Morbidity/ mortality statistics were given
- The organic processes of illness were mentioned
- Prevention was mentioned
- Prognosis was described
- Subjective experiences of health and illness were mentioned
- Symptoms were given
- Treatment was described as either there or not.

2.5.3.12 Environmental influences on health

Articles in this category included topics such as pollution, working conditions and housing conditions.

2.5.3.13 Exercise and fitness

These included exercise routines, benefits of exercise on health against diseases, or health risks associated with exercise.

2.5.3.14 Gynaecology (female)

This category was used to record all diseases and problems affecting the female reproductive system, e.g. menopause, pre-menstrual syndrome.

2.5.3.15 Medical advances/ research

Articles reporting new technologies in health were included here, as were all reports of new medical research or advances in the understanding of the biological processes associated with health. Requests for research volunteers were also recorded here.

2.5.3.16 Medical incompetence/ negligence

All instances of incompetence and/ or negligence by health professionals were recorded in this category.

2.5.3.17 Mental health

Mental health topics such as child abuse, stress, and emotional disturbances, not including disabilities, were categorised here. Compulsive eating disorders were also recorded here, as well as in the diets and addictions categories.

2.5.3.18 NHS

Articles mentioning the NHS were included here. Evaluation of author bias with regard to the NHS was not included.

2.5.3.19 Obstetrics

This category covered pregnancy (including miscarriage), birth, infertility problems (male and female) and treatment. Male infertility was also recorded under urology.

Induced abortion was recorded under birth control.

2.5.3.20 Prevention

Articles included in this category dealt with topics such as dental check-ups, and health education material aimed at individuals. Discussions about healthy eating, and exercising for health were both recorded here, as well as in the diets or exercise and fitness categories, as appropriate.

2.5.3.21 Private Medicine

Articles discussing private medicine, and hospitals were recorded here.

2.5.3.22 Self-Help

This category was used to record articles dealing with special support groups for patients, and articles encouraging readers to help themselves towards better health.

2.5.3.23 Sex, sexuality and health

This included transgender operations and health, sex and associated health risks.

2.5.3.24 Skincare

Articles discussing protection, and maintenance of the skin against the sun/ wind/ smoking were recorded here.

2.5.3.25 Urology-genitary (male)

This category was introduced as an equivalent to gynaecology. Articles dealing with specifically the male reproductive system, such as IVF and prostate cancer, were included here.

2.5.3.26 Other
Articles not covered by any of the above categories, such as drug side-effects, were included here.

2.5.4 Sources of health information
In order to evaluate the credibility of health information in magazine articles, specific sources quoted in articles were categorised as follows:

Books, Conference/ Meeting, Events, Government reports, Institution reports, Journals,

Previous magazine article, None given, Original, Other.

As many categories were used as necessary for this section. Unspecified sources such as 'US research' were recorded under Events.

2.5.5 Persons quoted
To evaluate the importance given to different points of view, the persons quoted in the articles were categorised as follows:

Health services, Medical or health or science professional, Patient or client or health subject, Politician or government spokesperson, None quoted, Other.

As many categories were used as necessary for this section.

2.5.6 Orientation
In order to evaluate whether the periodicals press influence health coverage by using traditional news criteria, articles were coded for orientation as follows:

- Event based with little or no information about the health topic.
- Event based with adequate information about the health topic.
- Issue oriented with in-depth discussion about the health topic.

2.5.7 Writing style
Articles were assessed for their writing style and categorised as follows:

- Educational-informative (based on facts and references).
- Human interest.
- SensationalisedO human interest (purely subjective experience of health, no quotes, no references).

The distinctions were somewhat subjective, but the use of other categories such as sources, orientation, and persons quoted helped to clarify the writing style.

2.5.8 Target Audience
This was divided into two groups to best assess to whom the health information would be most useful.

- Age: Older children, Adolescent, Adults, Parents, Elderly, Everyone or None given.
- Sex: Both, Female, Male, or None given.

The gender of the audience was deemed important to record as well as the age in order to evaluate possible gender biases from the magazines.

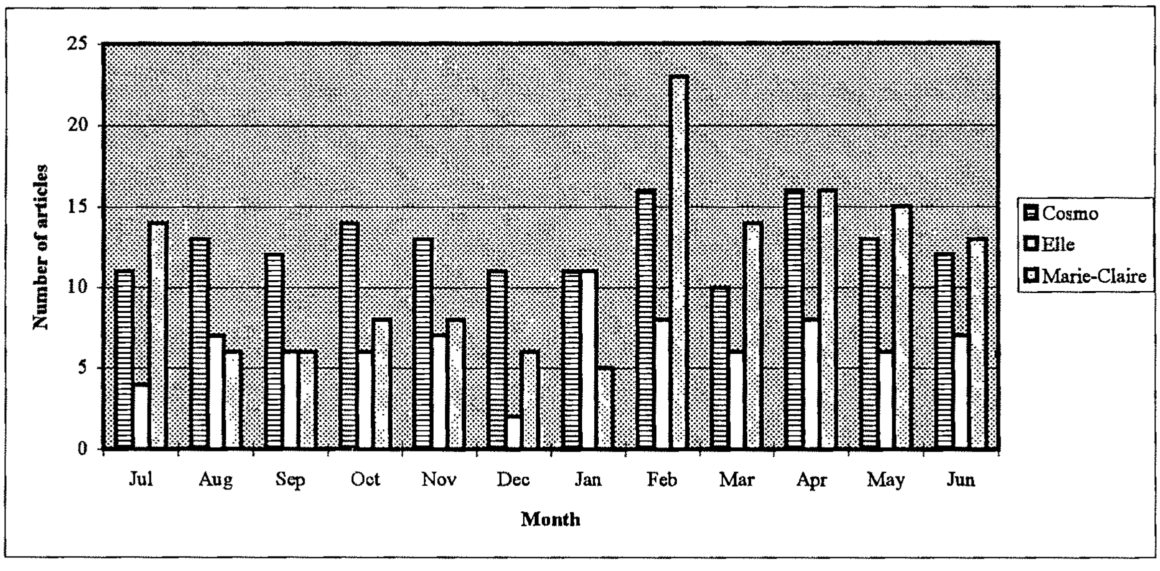
2.5.9 Main subject
The main subject of the article was recorded as being as follows:

Foetus, Infant, Child, Adolescent, Female adult, Male adult, or None given.

2.5.10 Practical help
In order to evaluate whether the magazines encouraged the reader to modify his/ her behaviour, the amount of practical help given in each article was assessed by using the following categories:

Book/ report, Contact address/ telephone number/ email/ WWW, Direct advice, Extra free

Figure 1: Number of articles over the period of study July 1995 – June 1996



printed information, Product information, None given, Other.

2.5.11 Communication with the public

To assess whether the periodicals press facilitated the understanding of health information, communication of the articles was assessed as follows:

- Illustrations/ photographs were evaluated for relative size: < ¼ page, ¼ page, ½ page, full page, or none.
- Jargon/ technical terms were coded as being present or not.
- Definition of unusual terms were coded as being defined or not.

3. Results

3.1 Women's magazines

The results for Cosmopolitan, Elle, and Marie-Claire have been grouped, and are given in Figures 1-17.

Figure 1. Cosmopolitan had the most health articles over the period of study with 152 articles recorded as being health or health related. Marie-Claire had 134, and Elle had the lowest with 78 articles.

Over the year, Cosmopolitan had a steady number of articles with two peaks of 16 in February and April, and a low of 10 in March. Elle, on the other hand, varied the number of articles on a monthly basis, with a maximum of 11 in January and a minimum of 2 in December. Marie-Claire varied even more widely than Elle with a peak of 23 articles in February and a low of 5 in January.

Figure 2. This was calculated by recording the total number of magazine pages in each issue, and the total number of health pages in each issue (see section 2.5.1).

The highest point of health coverage was in February for Cosmopolitan (15%). Marie-Claire's peak coverage of health was in July (15%), and Elle's was 11% in September.

There seemed to be no clear pattern of health coverage over the year of study, although Cosmopolitan had the highest yearly coverage with 11%, Marie-Claire came second with 7% and Elle with 6%.

Figure 3. All three magazines had more articles that were just a reference to health than were one quarter or more about health. 52% of Cosmopolitan articles were just a reference to health, as were 56% of Elle articles, and 51% of Marie-Claire articles.

Figure 2: Percentage size of health coverage by issue

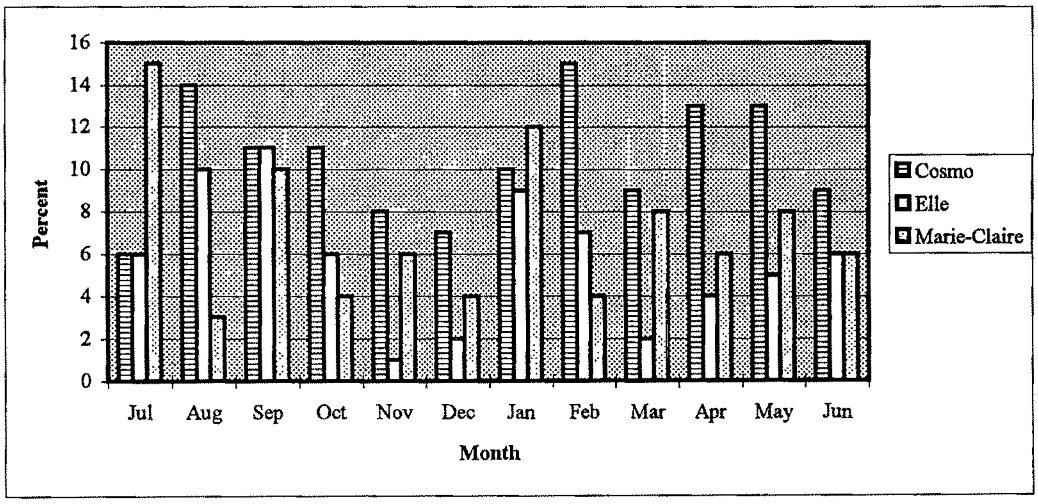


Figure 3: Focus of health coverage

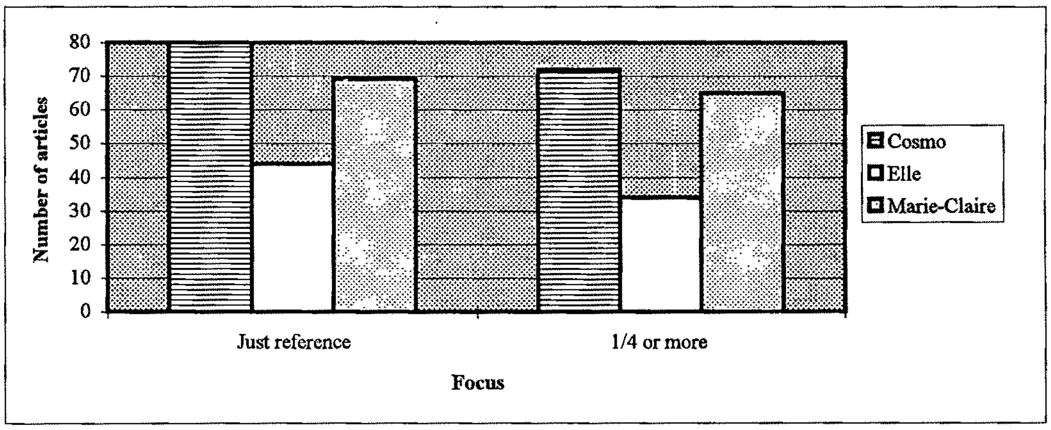


Figure 4. Cosmopolitan was the only magazine which had more health articles (53%) outside their health section. Marie-Claire on the other hand, had more articles (56%) in their health section. Whereas Elle had exactly the same amount of health articles (50%) in their health section as in the rest of the magazine.

Figure 5. In all three women's magazines the majority of authors, when specified, were female. Elle was the only magazine to have two incidences of co-authorship with both a female and male author.

All three magazines had a small number of articles written by male authors. Cosmopolitan had the highest number with 12 articles, Marie-Claire had 9 articles, and Elle had 5 articles written by male authors.

However, Marie-Claire had the highest number of articles (14) which did not attribute any gender or

Figure 4: Number of articles in the health sections

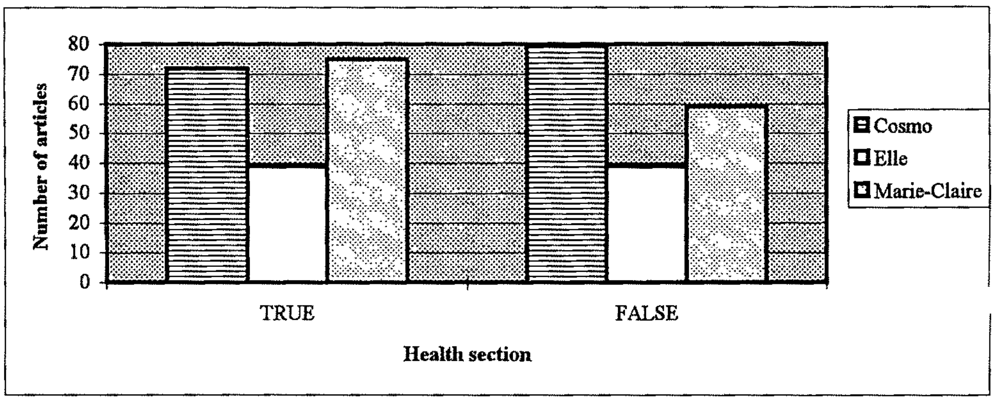


Figure 5: Gender of authors

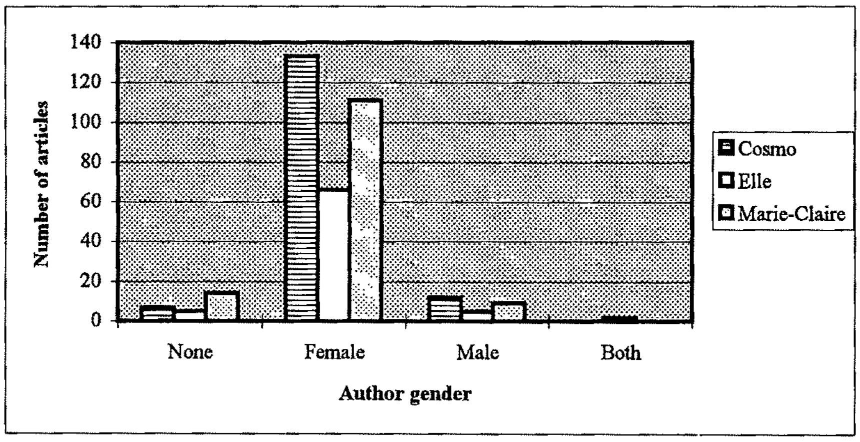


Figure 6: Types of article

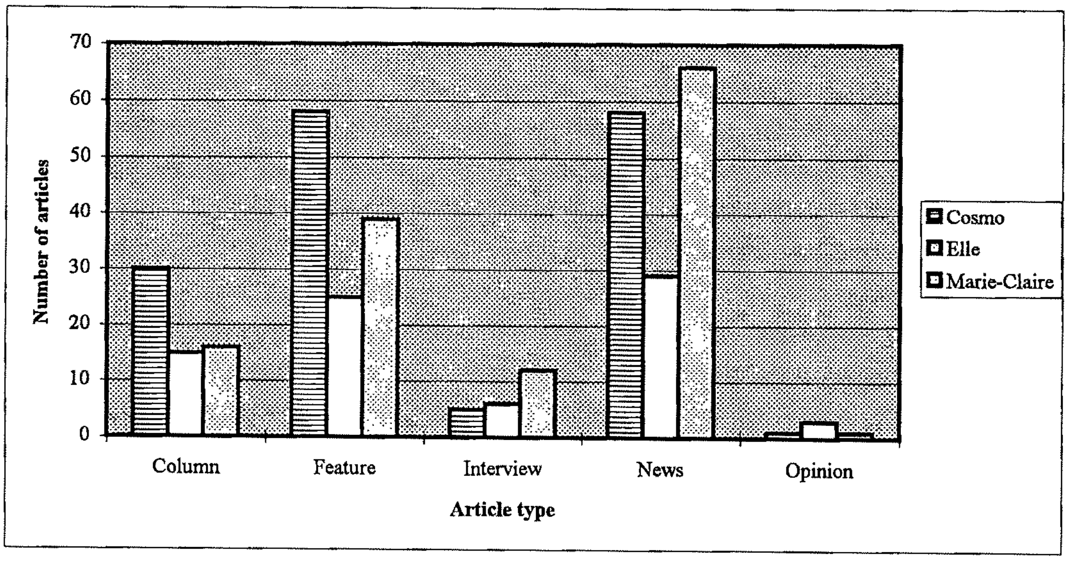


Figure 7: Orientation of the health articles

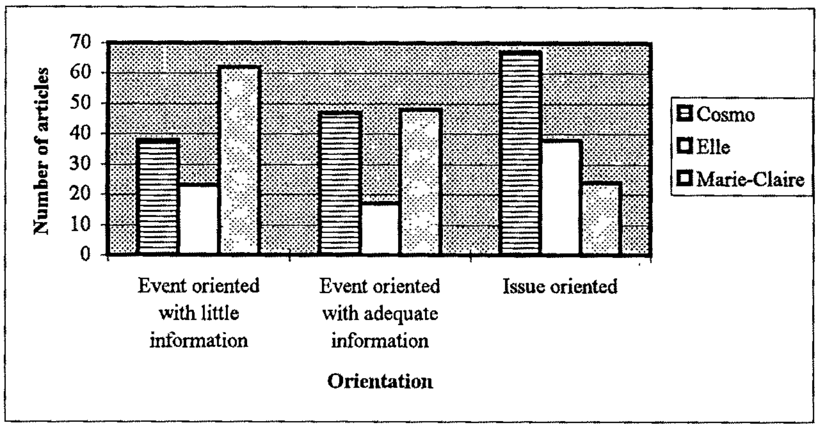
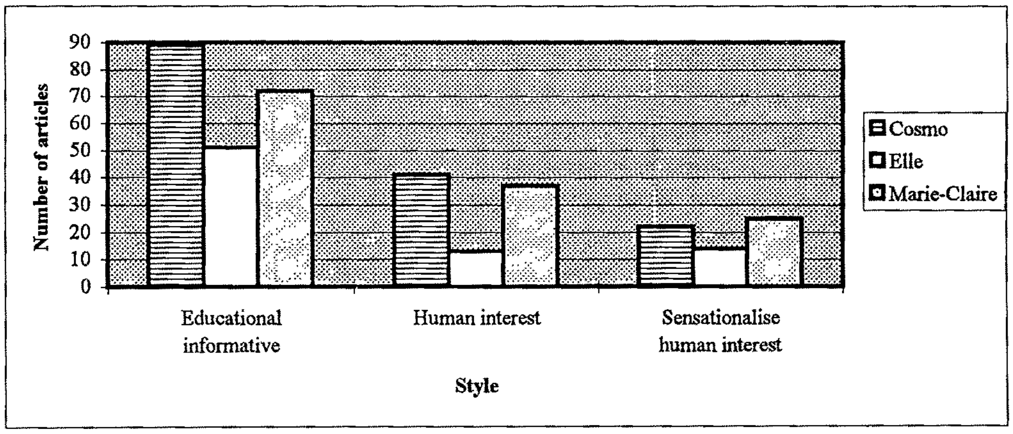


Figure 8: Writing style



named author. Cosmopolitan had the second highest with 12, and Elle had the lowest with 5 articles unattributed.

Figure 6. All the health articles were categorised into the above types. From the above figure, it is clear that the majority of health articles are in either news or feature formats. However, Marie-Claire had the most articles in the news type (66) and Elle had the lowest with 29. Cosmopolitan had an equal number of articles which were in the news, and feature type (58).

Column type articles were the third type of article used to convey health information with Cosmopolitan (30 articles) using this more than either Marie-Claire (16) or Elle (15).

Interviews were used considerably less than any of the other three types, but were used more by Marie-Claire (12 articles), than by Cosmopolitan (5) or Elle (6).

The least used type of article was the opinion with only one article recorded as being of this type for both Cosmopolitan and Marie-Claire, Elle had three.

Figure 7. Cosmopolitan had the highest number of issue oriented articles (67), and Marie-Claire the lowest with 24. On the other hand, Marie-Claire had the most articles (62) which were event oriented with little information about the health topic, and Elle the lowest with 23.

Elle had more articles which were issue oriented (38) than were even oriented with little information (23) or event oriented with adequate information (17).

In fact, Cosmopolitan and Marie-Claire show diametrically opposite patterns (see Figure 7), with Cosmopolitan's articles increasing towards being issue oriented, and Marie-Claire's increasing towards being event oriented with little information.

Figure 8. All three women's magazines had the majority of articles written in an educational informative style. Cosmopolitan and Marie-Claire had the next two highest number of articles (41 and 37 respectively) written in a human interest style with Elle being the lowest with 13 articles. However, Cosmopolitan and Marie-Claire had similar numbers of articles (22 and 25 respectively) written in a sensationalised human interest style. Elle had the lowest of the group with 14 articles.

Figure 9. The top three health topics for Cosmopolitan were mental health (36 articles), sex/sexuality/health (29) and medical advances (25) (see Figure 9). Marie-Claire's top three subjects were medical advances (29), sex/sexuality/health came joint second with diets (17), and gynaecology third with 14 articles. Elle's top three were sex/sexuality/health (14), medical advances (12), and mental health (11).

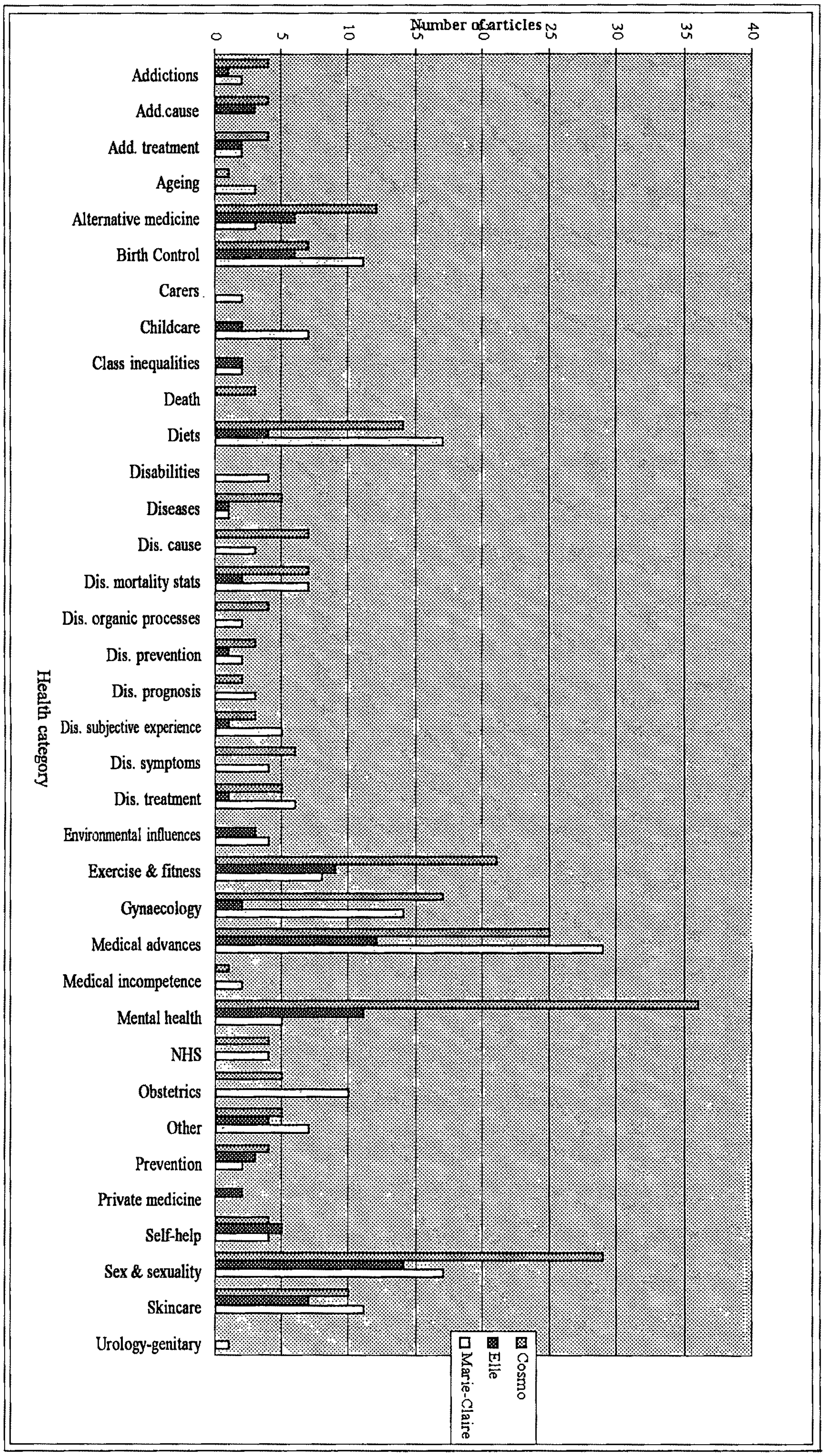


Figure 9: Health categories

The least discussed topics in these magazines were male urology-genitary issues, with only one article in Marie-Claire, and private medicine with only two articles in Elle.

Of the magazines in the women's sample, Marie-Claire covered the biggest range of topics with only the causes of addictions, death, and private medicine not being covered. Cosmopolitan covered the next biggest range, but did not cover carers, childcare, class inequalities, disabilities, environmental influences, private medicine or urology-genitary issues. Elle covered the smallest range of health issues, and omitted ageing, carers, death, disabilities, causes of diseases, organic processes of diseases, prognosis of diseases, symptoms of diseases, medical incompetence, NHS, obstetrics, and urology-genitary issues.

However, all three magazines had similar numbers of articles not covered by the listed categories. Cosmopolitan had five 'other' articles, Marie-Claire had the most with seven, and Elle the least with four articles. A list of the other categories, such as neck pain, colonic irrigation, and sleep, is given by magazine in Graham[44].

Figure 10. Cosmopolitan had the highest number of articles (67) which could be considered to be original, its second highest number (33) attributed sources of information to institutions. Furthermore Cosmopolitan had an almost equal amount of articles attributed to an event (17) or no source at all (16).

Marie-Claire's highest number of articles (44) were in the section for no source given, the second highest number were original articles (33). Also for Marie-Claire, an almost similar amount of articles were attributed to either an event (27) or an institution (25).

On the other hand the majority of Elle's articles were attributed to an event (24) or considered original (23). None of the three magazines based their articles on previous magazine articles.

However, both Marie-Claire and Cosmopolitan had one article which quoted a different type of source which did not fit into the pre-assigned category. Details of these other sources can be found in Graham[44], together with a list of journal titles quoted (including the Journal of Clinical Gastroenterology, New Scientist, and the Journal of Personality and Social Psychology).

Figure 10: Sources of health information

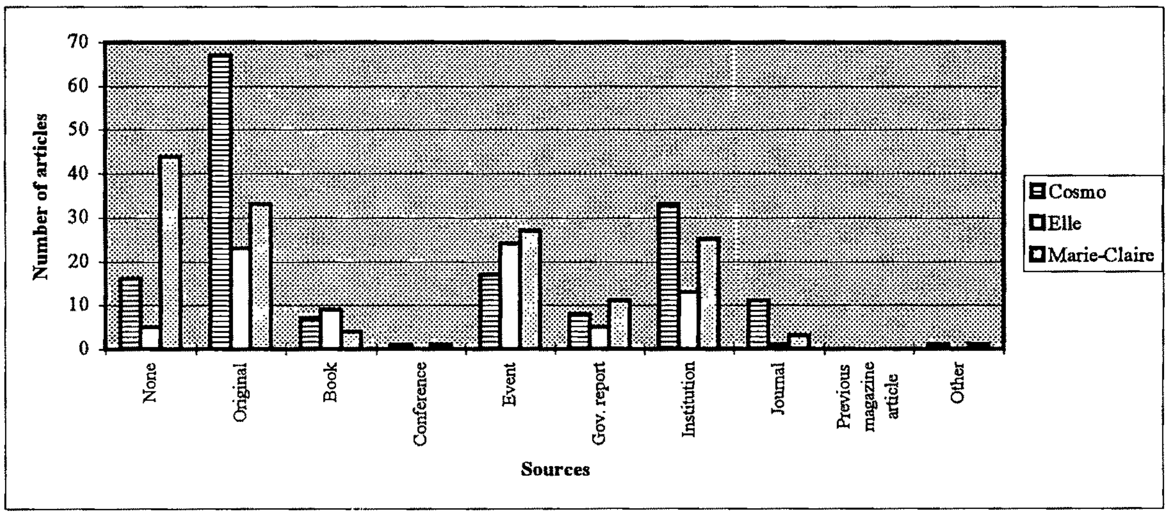


Figure 11: Types of persons quoted in the health articles

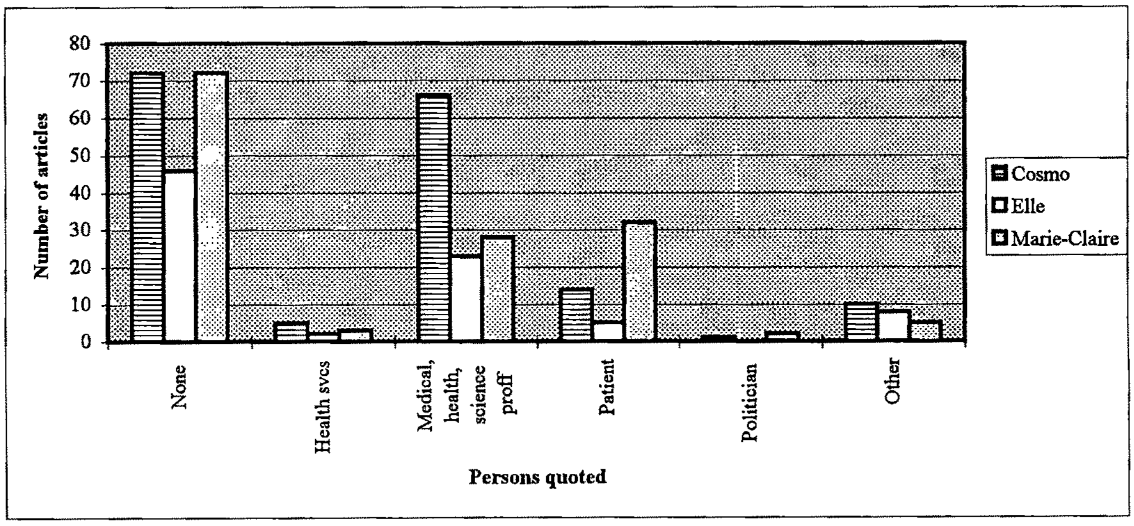


Figure 11. The majority of health articles in all three of these magazines did not quote any type of person. However the most quoted type of person was for Cosmopolitan and Elle a medical, science or health professional (66 and 23 respectively). Marie-Claire's most quoted person was the patient (32), much higher than either Cosmopolitan (14) or Elle (5). The least quoted type of person was a politician or government spokesperson with only one article for Cosmopolitan, and two for Marie-Claire.

Nevertheless, all three magazines did quote other types of persons which did not fit the pre-assigned categories. Some of these included a fitness instructor, a Chief Constable and a hairdresser. A full list of these is given by Graham[44].

Figure 12. The majority of the health articles in these magazines did not contain jargon, and therefore did not need to elucidate any unusual terms. When articles did contain jargon in all cases the unusual terms were defined appropriately. Cosmopolitan had 85% of its articles not containing any jargon, Marie-Claire 78%, and Elle 82%.

Figure 13. All three magazines in the sample gave some form of practical help, all of which were recorded in the pre-assigned categories. Marie-Claire had the largest amount of articles (77) which provided no practical help whatsoever, with Cosmopolitan second (36) and Elle last with 30 articles.

Cosmopolitan's main form of practical help was direct advice (76), as was Marie-Claire's (32),

Figure 12: Jargon and definition of unusual terms

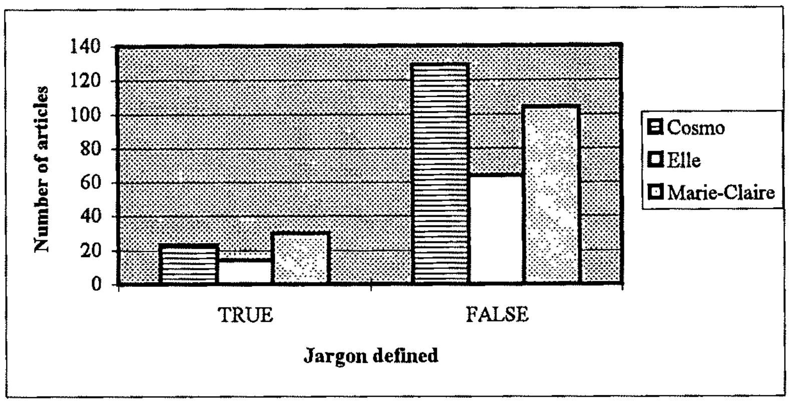


Figure 13: Practical help

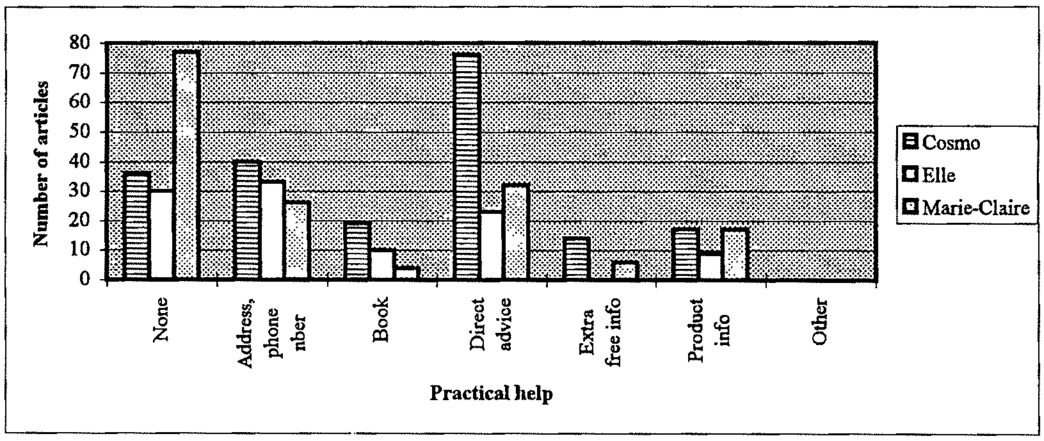
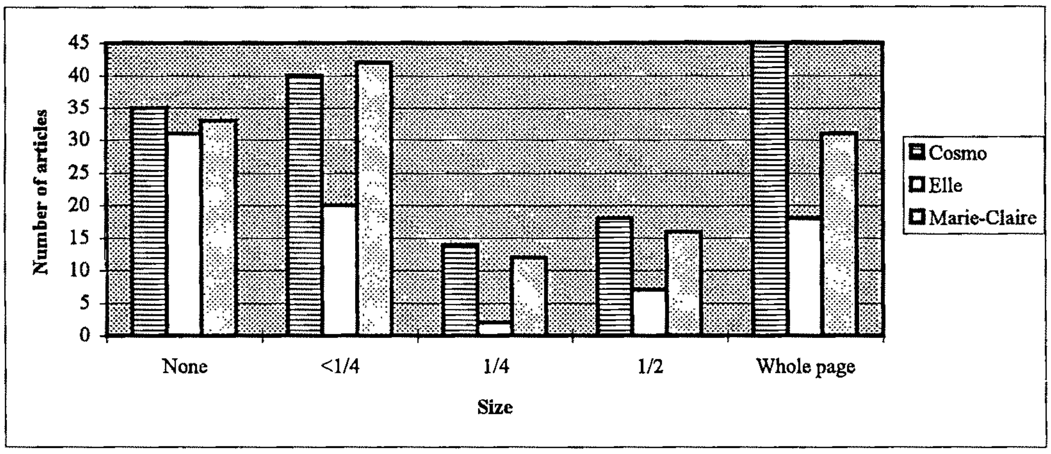


Figure 14: Relative sizes of illustrations and pictures accompanying the health articles



whereas Elle's was to provide a contact address or telephone number (33). The least used form of practical help by all three magazines was extra free information.

Figure 14. Cosmopolitan gave the largest number of whole page illustrations and pictures (45) whereas Marie-Claire only provided 31 articles with whole page illustrations and Elle 18. The most used size of illustrations was under a quarter of a page. Although a large proportion of the articles contained no illustrations whatsoever.

Figure 15. The favourite age for the target audience was everyone with Cosmopolitan providing 85% of articles for this audience, Marie-Claire 74% and Elle 85%. A small percentage of articles, 10% for Cosmopolitan, 20% for Marie-Claire and

Figure 15: Relative ages of the target audience

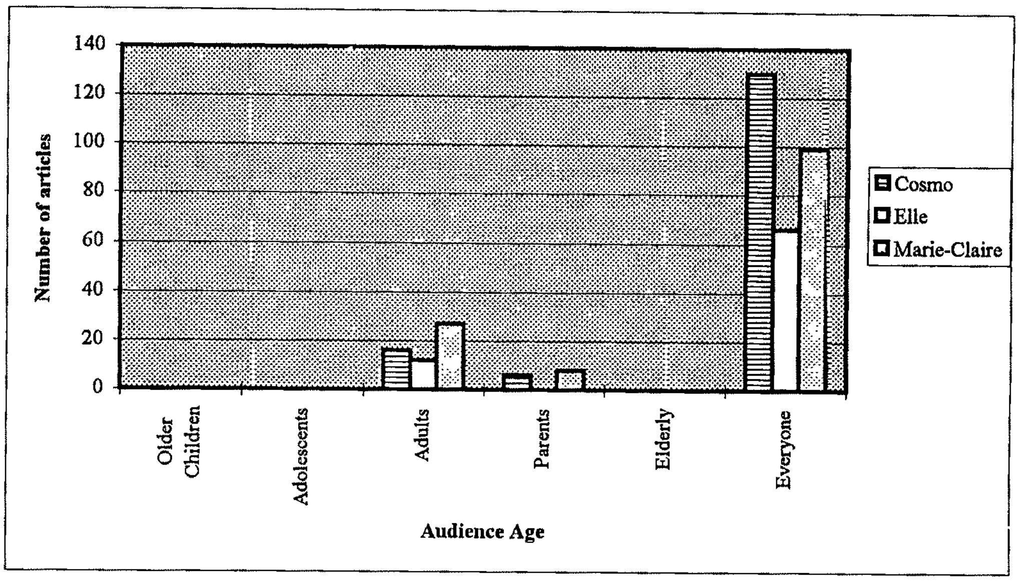


Figure 16: Gender of the target audience

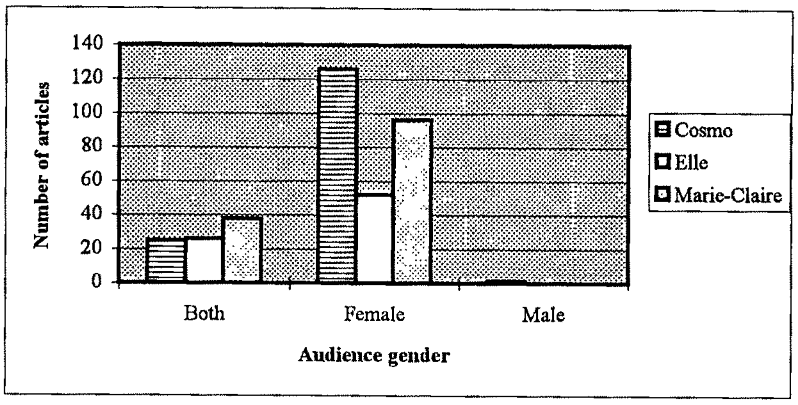
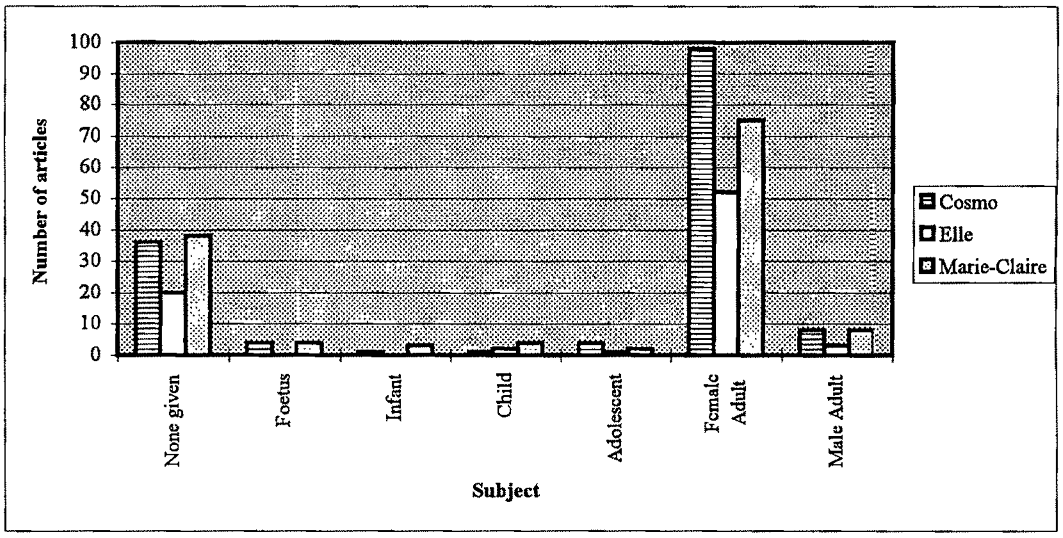


Figure 17: Main subject of the health article



15% for Elle, were written for adults. No articles were addressed to older children, adolescents or the elderly. Finally, Elle had no articles targeted at parents, while Cosmopolitan had six and Marie-Claire eight.

Figure 16. Cosmopolitan had the highest proportion of articles (83%) directed at females, Marie-Claire came second with 72% and Elle 67%. All three magazines also aimed a varying proportion of their articles at both men and women: Cosmopolitan (16%), Marie-Claire (28%), and Elle (33%). Of the three magazines only Cosmopolitan had one article aimed solely at men.

Figure 17. Both Marie-Claire and Cosmopolitan had the widest range of main subjects with all the pre-assigned categories appearing in at least one health article. Elle had the smallest range and did not have any articles about either foetuses or infants.

The most popular main subject for all three magazines was the female adult, with no apparent main subject being the second. Interestingly, male adults figured more than foetuses, infants or children, with both Cosmopolitan and Marie-Claire having eight articles about male adults, and Elle three.

3.2 Men's magazines

The results for Esquire, GQ, and Maxim have been grouped, and are given in the following Figures 18-34.

Figure 18. **Note:** Esquire only produces one issue for both July and August, the results of which are presented under July, and only one issue for December and January, the results of which are presented under December.

For the period of study Maxim had the most health articles (194), with GQ second (122), and Esquire having the least with 81 articles. Maxim had two peaks in July (21) and June (23). The peaks for GQ on the other hand were in July (14) and May (13). Esquire's peaks were in March (10) and May (10).

However, the lowest number of articles during the year were in November for Esquire (six) (excluding August, and January, see *Note* above), February for GQ (six), and September for Maxim (12).

Figure 19. Maxim had the highest percentage of health coverage over the year of study with 10%, and Esquire the lowest with 3%. GQ was in the middle with 5%.

Figure 18: Number of articles over the period of study July 1995 – June 1996

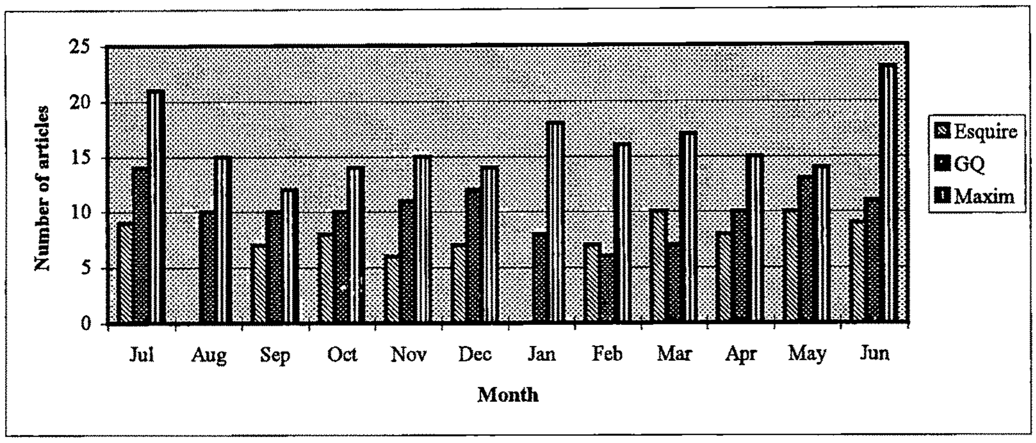
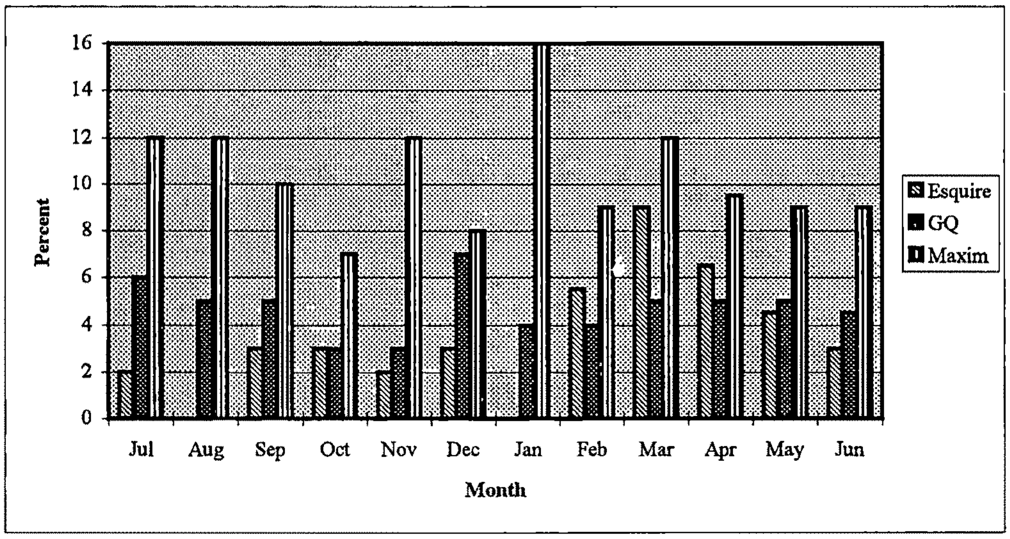


Figure 19: Percentage size of health coverage by issue



The biggest month for health coverage was January for Maxim (16%), December for GQ (7%), and March for Esquire (9%).

As before, percentage of health coverage was calculated from the total number of pages for each issue, and the total number of health pages for each issue, see section 2.5.1.

Figure 20. GQ had exactly 50% of articles being either just a reference to health or one quarter or more about health, whereas 70% of Esquire's articles were just a reference to health, and 43% of Maxim's were found in the same category.

Figure 21. The majority of all health articles in men's magazines were found to be in their health sections and not really in the rest of the magazine: 84% for Maxim and GQ, and 82% for Esquire.

Figure 22. All three magazines had male authors for their articles. However, a significant number of Esquire articles (25) gave no indication of an author at all, whereas Maxim had a large proportion of articles (23) written by both male and female authors.

Figure 20: Focus of health coverage

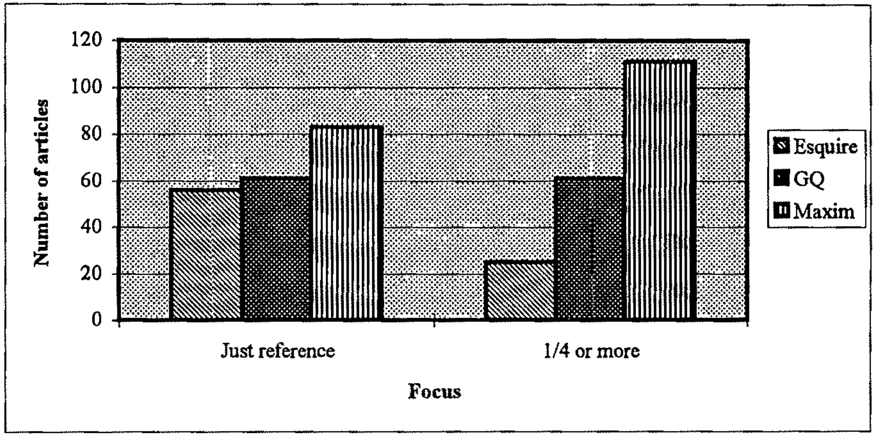


Figure 21: Number of articles in the health sections

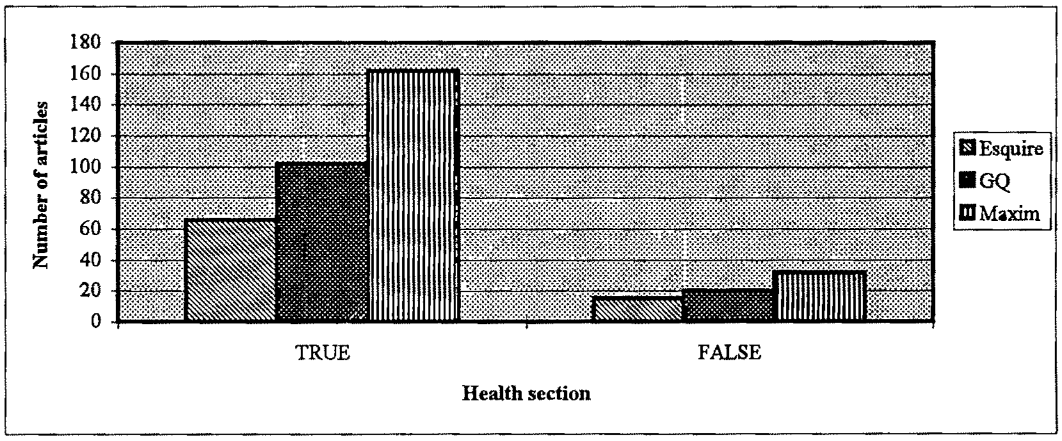
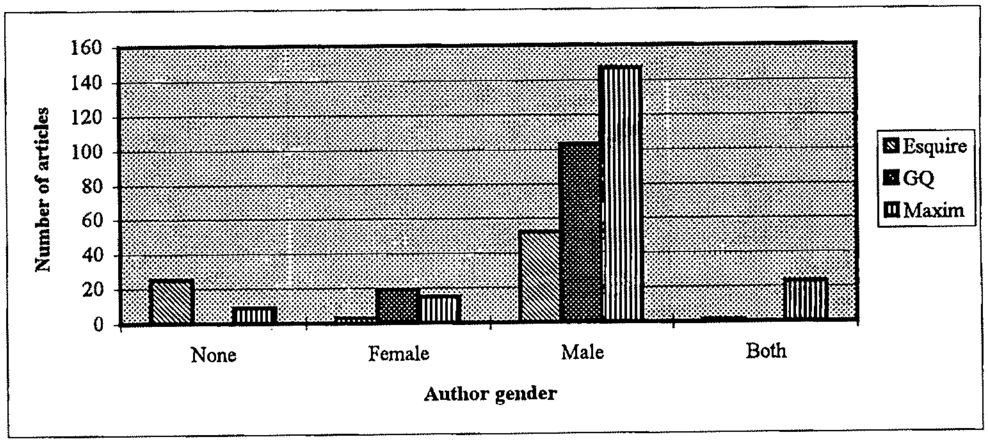


Figure 22: Gender of authors



Female authors were quite common in all three magazines with Maxim having 15 articles written by a female, GQ 19, and Esquire 3.

Figure 23. The two most used types of articles for health were news, and columns. Maxim had the most articles in news (78) or column format (74). But GQ had 61 in column type and 31 features which were more than its 28 news type. Esquire on the other hand, had a majority of articles (45) as columns, followed by news (20), and then features (15). The least used type of article was the interview scoring only one article for both Esquire and GQ and two for Maxim.

Figure 24. The majority of Maxim's health articles were found to be issue oriented (79), as were GQ's (73). Esquire's articles, on the other hand, were predominantly event oriented with little information about the health topic (38).

In fact GQ and Esquire show diametrically opposite patterns on Figure 24 above. GQ's number of articles increase towards being issue oriented, whereas Esquire's increase towards being event oriented with little information. Maxim shows a different picture with more articles being issue oriented, but less articles being event oriented with adequate information than event oriented with little information.

Figure 25. For both Maxim and GQ the majority of their health articles were found to be educational informative with Maxim scoring (112), and GQ

Figure 23: Types of article

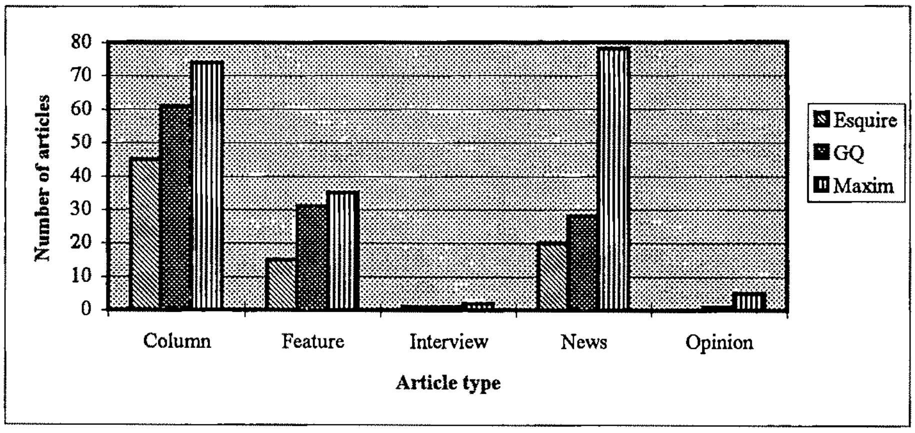


Figure 24: Orientation of the health articles

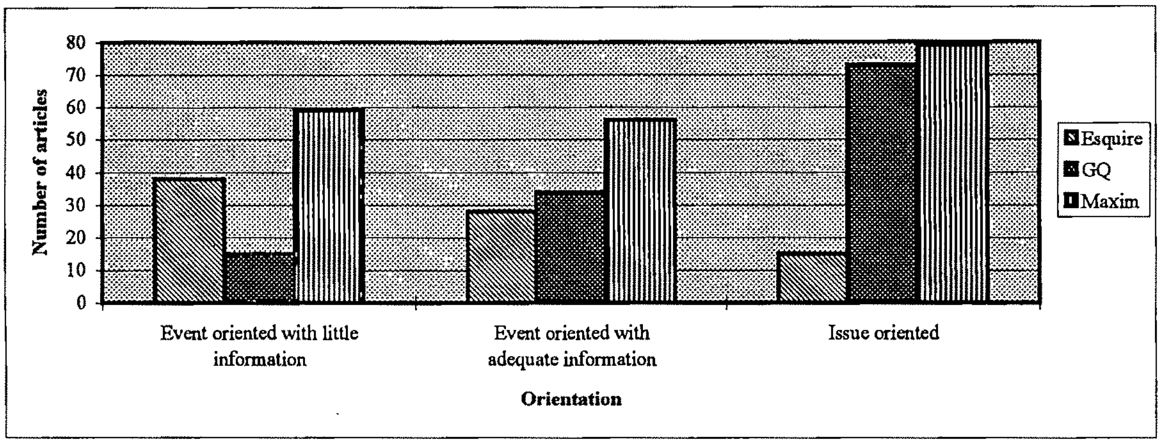
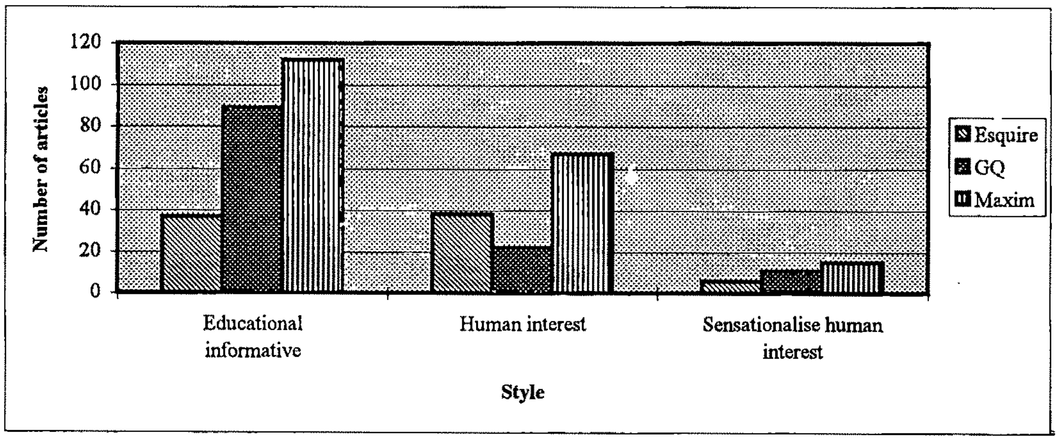


Figure 25: Writing style



(89). Esquire revealed an almost equal number of articles being educational informative (37), or human interest (38). None of the men's magazines had many articles which could be classified as being sensationalised human interest.

Figure 26. From Figure 26, the top three health categories for Esquire were other (10 articles), urology-genitary jointly with addictions (nine articles), and joint third were exercise, gynaecology and mental health with seven articles. GQ's top three health categories were exercise (33), sex/sexuality/health (14), and medical advances (12). Maxim's top three were exercise (32), diets (25), and joint third mental health, sex/sexuality/health, and urology-genitary which all scored 22 articles. The three least covered topics for all three magazines were carers, medical incompetence, and class inequalities which scored no articles in any of the three magazines.

Maxim appeared to cover the widest range of topics, and did not cover disabilities, disease prognosis, carers, medical incompetence, or private medicine. Esquire covered the second largest range of topics, excluding the topics ageing, carers, medical incompetence, childcare, NHS, and private medicine. GQ seems to have covered the smallest range of topics in the chosen health categories, and excluded topics on addictions, their treatment, carers, medical incompetence, childcare, diseases, disease prevention/ prognosis/ subjective experience/ symptoms/ treatment, NHS, and obstetrics.

A significant number of articles were not able to be categorised in the pre-assigned categories and were recorded in 'other'. Maxim had the most of these (12) and GQ the least with 7 articles, Esquire had 10 such articles. Examples of these topics include tattoo removal, pet ownership, and repetitive strain injury. A full list of these can be found in Graham[44].

Figure 27. From the above figure it is clear that the majority of health articles in these men's magazines appear to be original in their sources. For Maxim the top two sources were original (66) and events (44). Similarly, GQ had 38 original, and 27 event sourced articles. Esquire, on the other hand, had 43 original articles, and 18 without any type of source.

Figure 27: Sources of health information

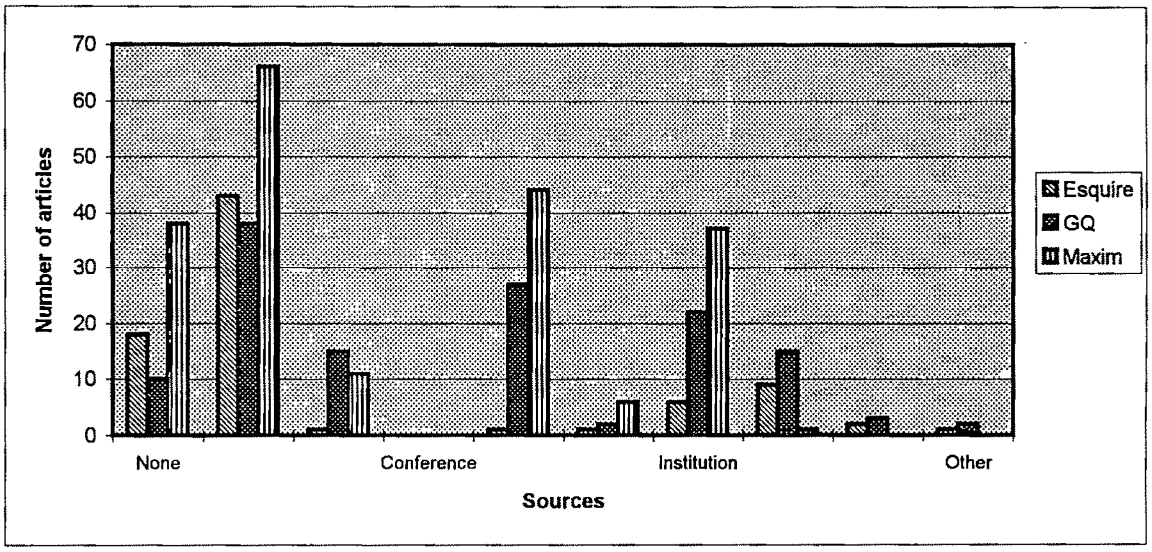
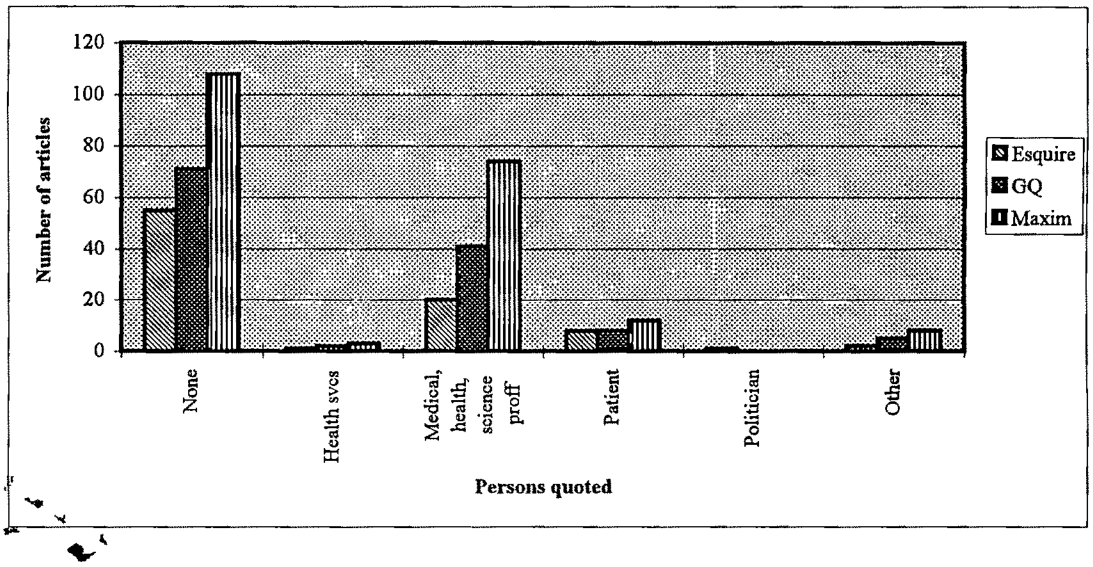


Figure 28: Types of persons quoted in the health articles



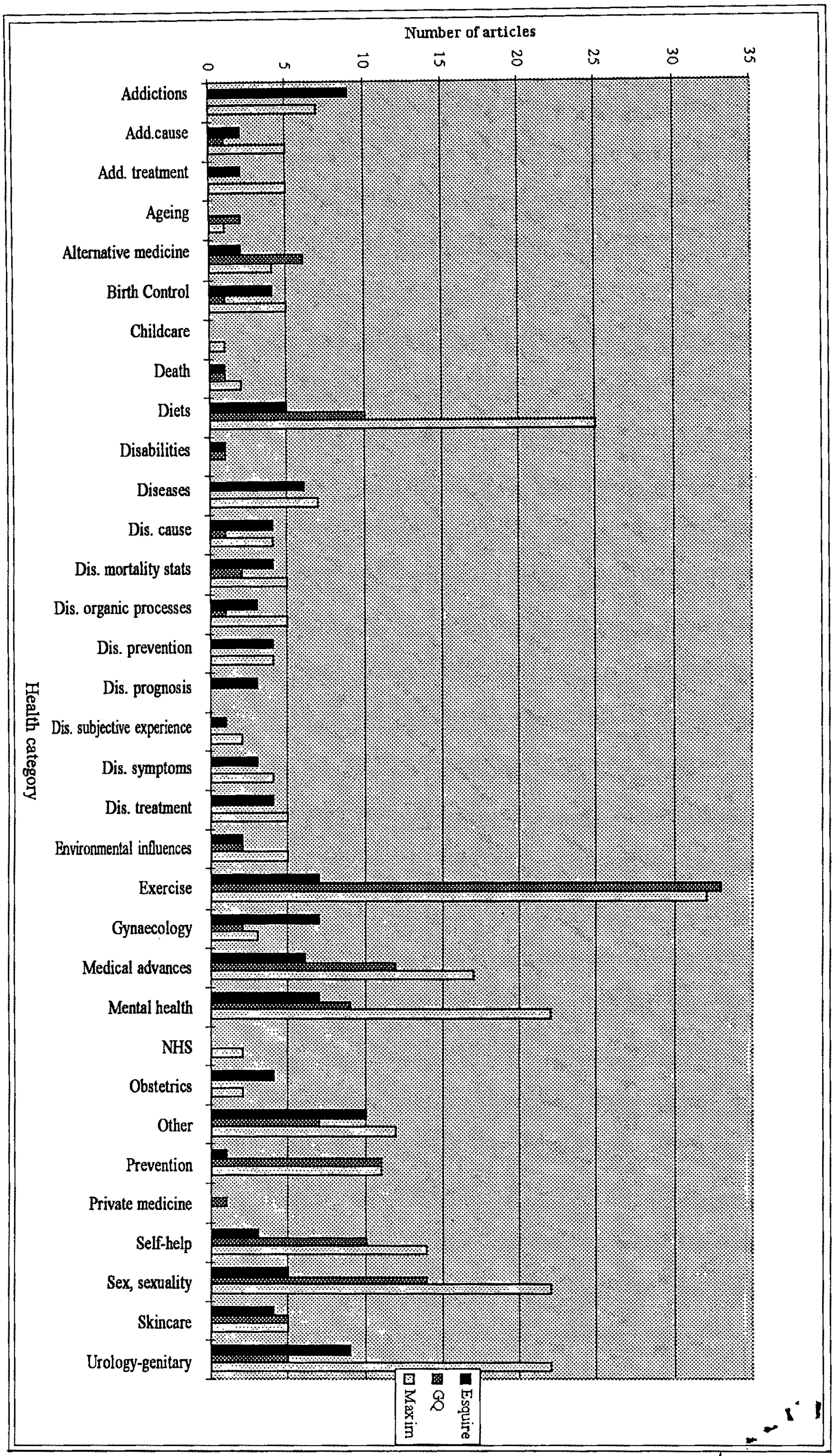


Figure 26: Health categories

The least used type of source was 'other', which enabled other sources unable to fit into the pre-assigned categories to be recorded. Esquire scored one article, and GQ two in this other type of source. Examples of these include the Garlic Information Centre. A list of these other sources is given by Graham[44], together with a list of journal titles referenced.

Figure 28. From the above figure the majority of Esquire, GQ and Maxim's health articles seemed to not quote any type of person. However, when a person was quoted, all three magazines quoted a medical, health or science professional over any other type. The least quoted type of person was the politician or government spokesperson. A proportion of these articles, two for Esquire, eight for both GQ and Maxim, quoted persons who did not fit into the pre-assigned categories. Examples of these included a spokesperson for the Footballers Association, a lifeguard and a hairdresser. A full list of other persons quoted is given by Graham[44].

Figure 29. The majority of health articles in all three magazines did not contain jargon, and therefore did not need to define unusual terms. Indeed 67% of Esquire's articles did not contain jargon, as did 76% of GQ's articles and 81% of Maxim's.

Figure 30. Esquire and Maxim's main form of practical help was direct advice, with Esquire having 42 articles providing this and Maxim 107. GQ on the other hand had more articles which provided no practical help whatsoever (43), than direct advice (41). All three magazines used all forms of practical help, but to varying degrees. However, the least used form of practical help was extra free information for Esquire (one article) and GQ (two articles), whereas Maxim's least used form of practical help was books with only ten articles.

Figure 31. Both Maxim and Esquire had the most articles (65 and 40 respectively) with no illustrations or pictures whatsoever. Whereas the majority of GQ articles had illustrations which were less than one quarter of a page (67). Maxim and Esquire's least used size of illustrations was the whole page (three and two articles respectively), whereas GQ's was both the quarter and half page sizes (six articles each).

Figure 32. 78% of articles in Esquire were apparently written for everyone, compared with 67% of articles in Maxim. GQ had 51% of articles written for everyone, and 49% for adults.

Whereas only 20% of Esquire and 31% of Maxim's articles were written for adults. No articles in any of the magazines were written for older children, adolescents or the elderly. Finally, GQ had no

Figure 29: Jargon and definition of unusual terms

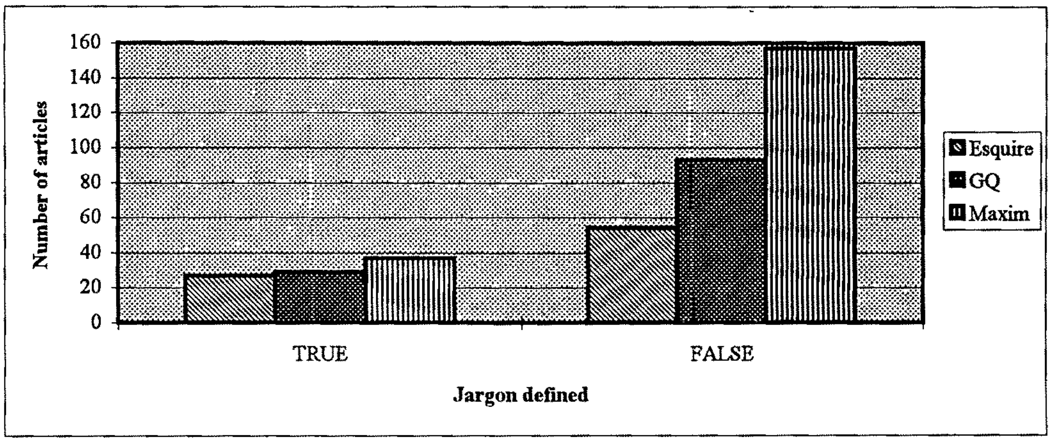
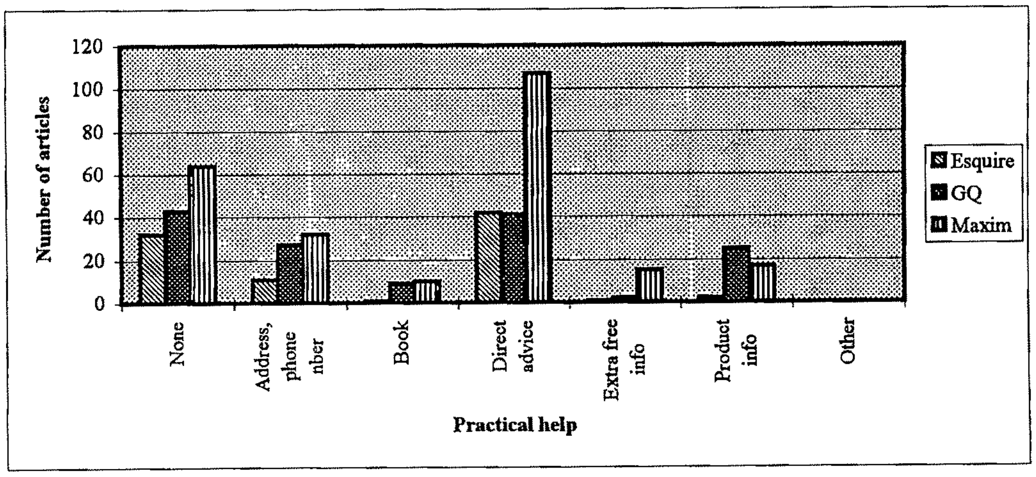


Figure 30: Practical help



articles for parents, while Esquire had two and Maxim four.

Figure 33. 73% of articles in Esquire were written for a male audience, 87% in GQ, and 81% in Maxim. None of the magazines wrote for a female audience explicitly, but a proportion of the articles appeared to be targeted at both sexes with 27% for Esquire, 19% in Maxim and 13% in GQ.

Figure 34. The most popular main subject for all three magazines was the male adult with Maxim scoring 130 articles, GQ 65 and Esquire 36. A large number of articles appeared to have no particular main subject, and some articles figured the female adult as a main subject with Maxim and GQ having 10 such articles, and Esquire the most with 15 articles about women.

The least used categories of main subject were the infant, child, and adolescent, although both Esquire and Maxim had a small number of articles written about foetuses (three and one respectively).

Figure 31: Relative sizes of illustrations and pictures accompanying the health articles

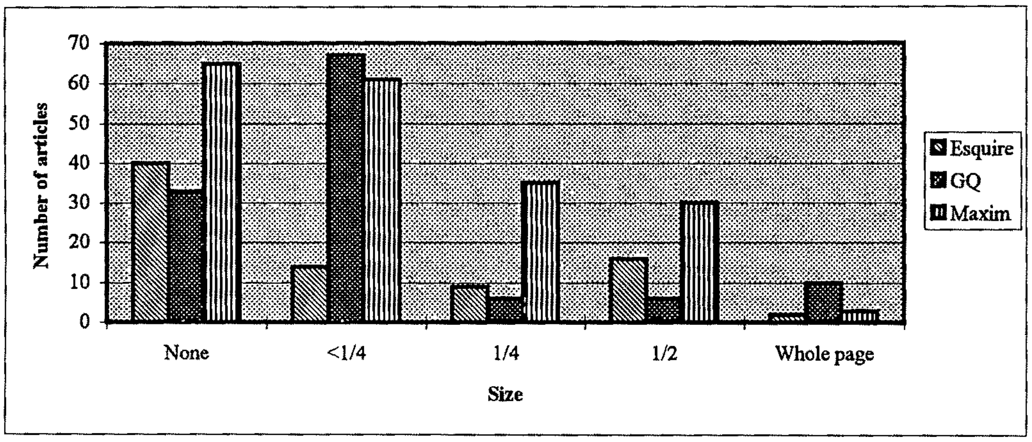


Figure 32: Relative ages of the target audience

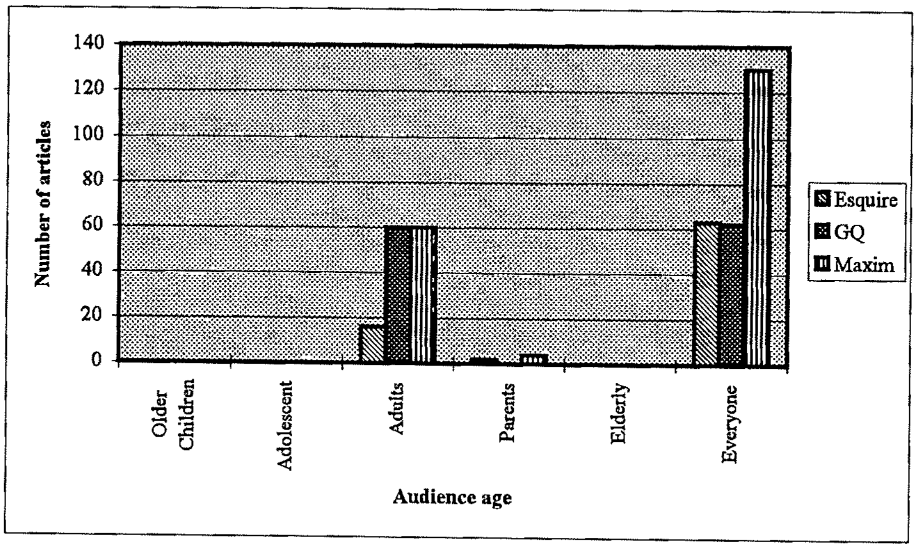
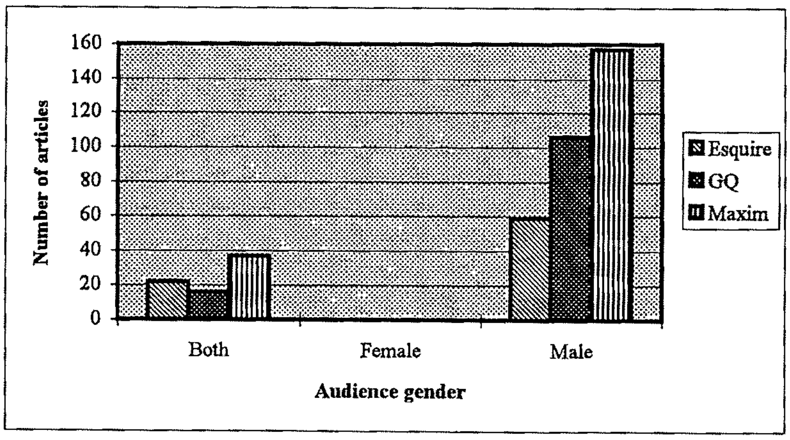


Figure 33: Gender of the target audience



3.3 Totals for women's and men's samples

The following Figures 35-51 show the total results of the three women's magazines and the three men's.

Figure 35. The total number of health articles for the women's magazine sample was 364 for the period of study, whereas the total men's number was slightly higher with 397 articles. The months with the most number of articles were February for the women and July for the men's magazines.

Figure 36. The percentage coverage of health in the women's magazines (8%) was higher than for the men's (6%). The peaks were also different, women's highest percentage coverage was in September (11%), and the men's highest was 9% in March.

Figure 37. 53% of articles in the women's sample and 50% in the men's sample were just a reference to health.

Figure 38. 51% of articles in women's magazines, and 83% of those in the men's were found to be in their own health sections.

Figure 39. 85% of articles in the women's group, and 9% in the men's were written by female authors. 75% of articles in the men's sample, and 7% in the women's were written by male authors.

Both groups had similar percentages of articles with unattributed authors (7% for the women, 8.5% for the men). However 0.5% of articles in the women's sample and 6% of the men's were written by authors of both sexes.

Figure 40. Women's magazines preferred article types were news (153 articles) and features (122), whereas the men's preferred types were column (180) and news (126). In both groups the least used article type for health articles was the opinion or debate.

Figure 41. 42% of articles in the men's group, and 35% in the women's were considered to be issue oriented. Both groups had roughly equal numbers of articles considered to be event oriented with little or adequate information.

Figure 42. In both groups a large majority of articles were in the educational informative style with men scoring 238 articles and women 212. However, the men's group had more articles (127)

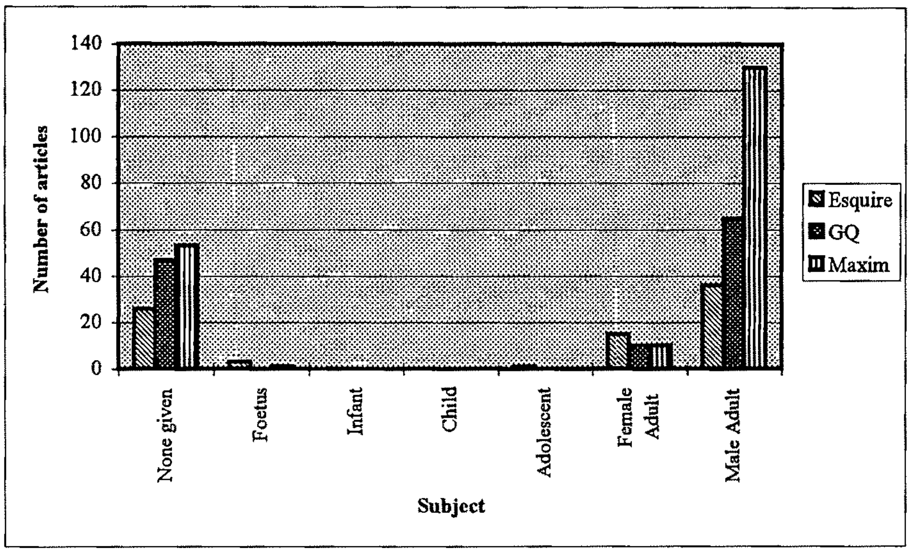


Figure 34: Main subject of the health article

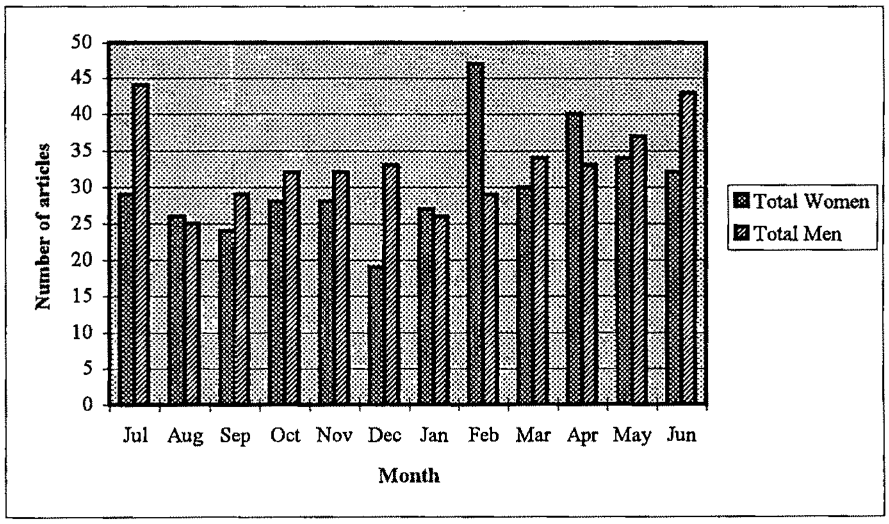


Figure 35: Number of articles over the period of study July 1995 – June 1996

Figure 36: Percentage size of health coverage by issue

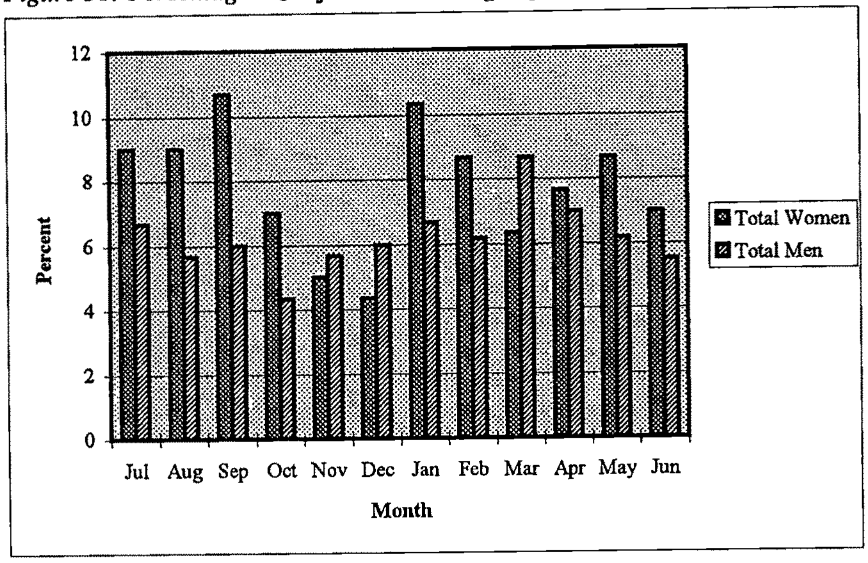


Figure 37: Focus of health coverage

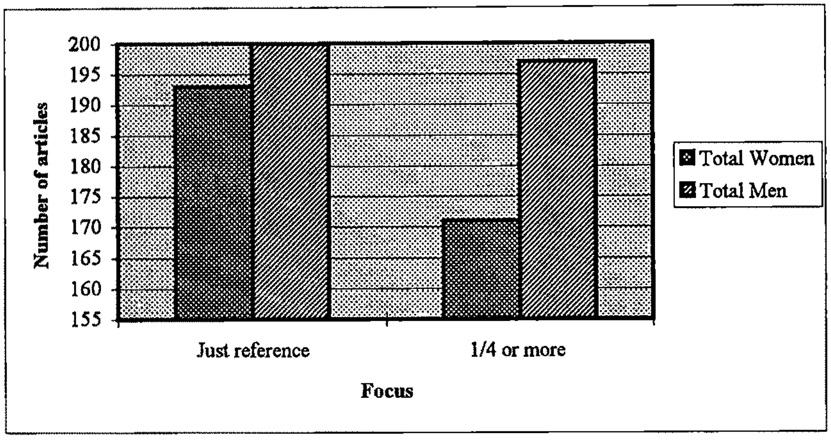


Figure 38: Number of articles in the health sections

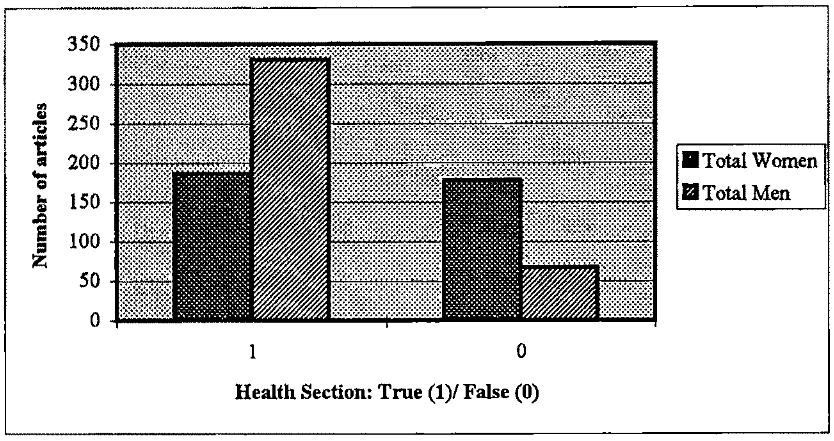
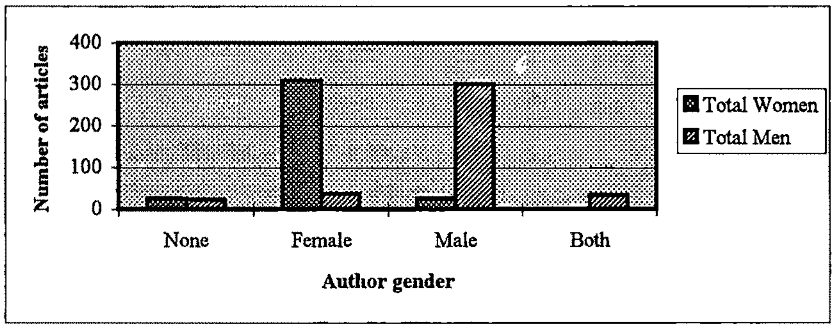


Figure 39: Gender of authors



than the women's (91) that were in the human interest style, while in the sensationalised human interest style the opposite was true, the women's group had more articles (61) than the men's (32).

Figure 43. The top two health categories for the women's group were medical advances (66) and sex/sexuality/health (60).

For the men's group, exercise came top with 72 articles, and sex/sexuality/health second with 41 articles (see Figure 43).

Both groups used the full range of pre-assigned health categories, although in the women's group the least used category was urology-genitary (one article in total), and in the men's group the least used

Figure 40: Types of article

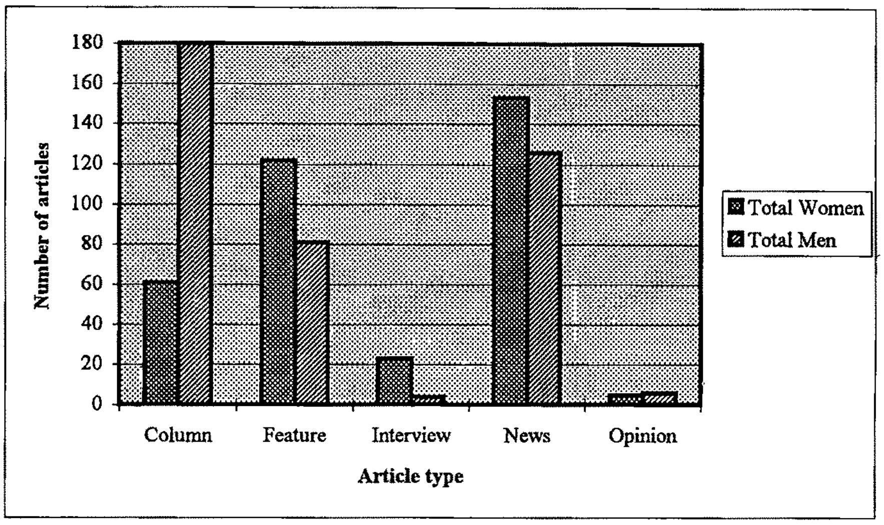


Figure 41: Orientation of the health articles

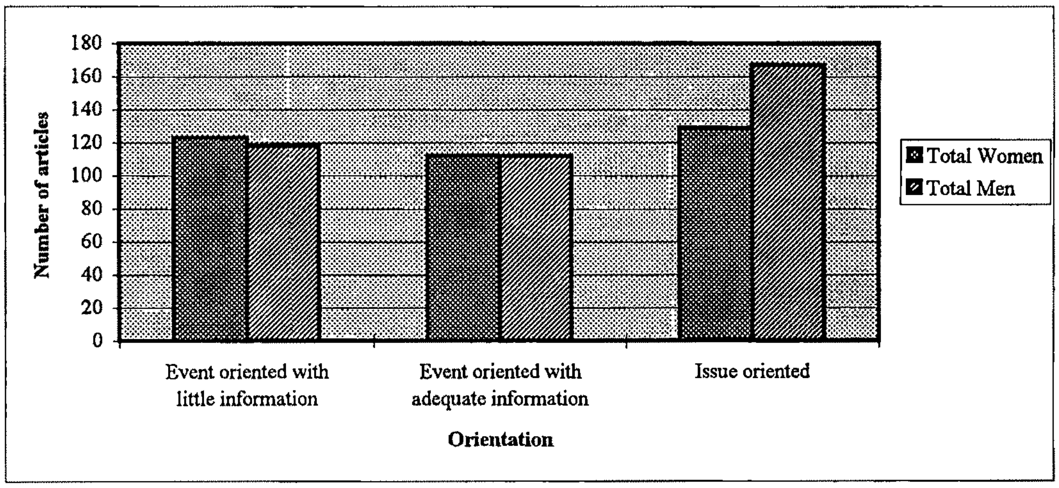
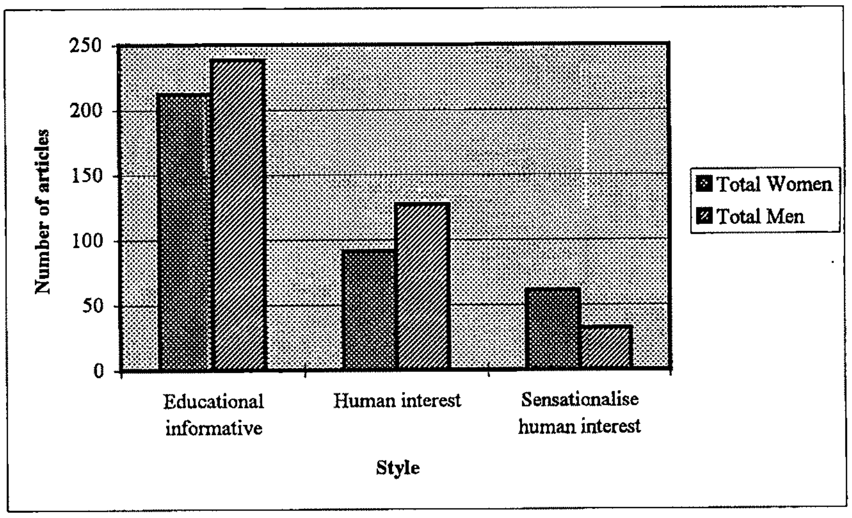


Figure 42: Writing style



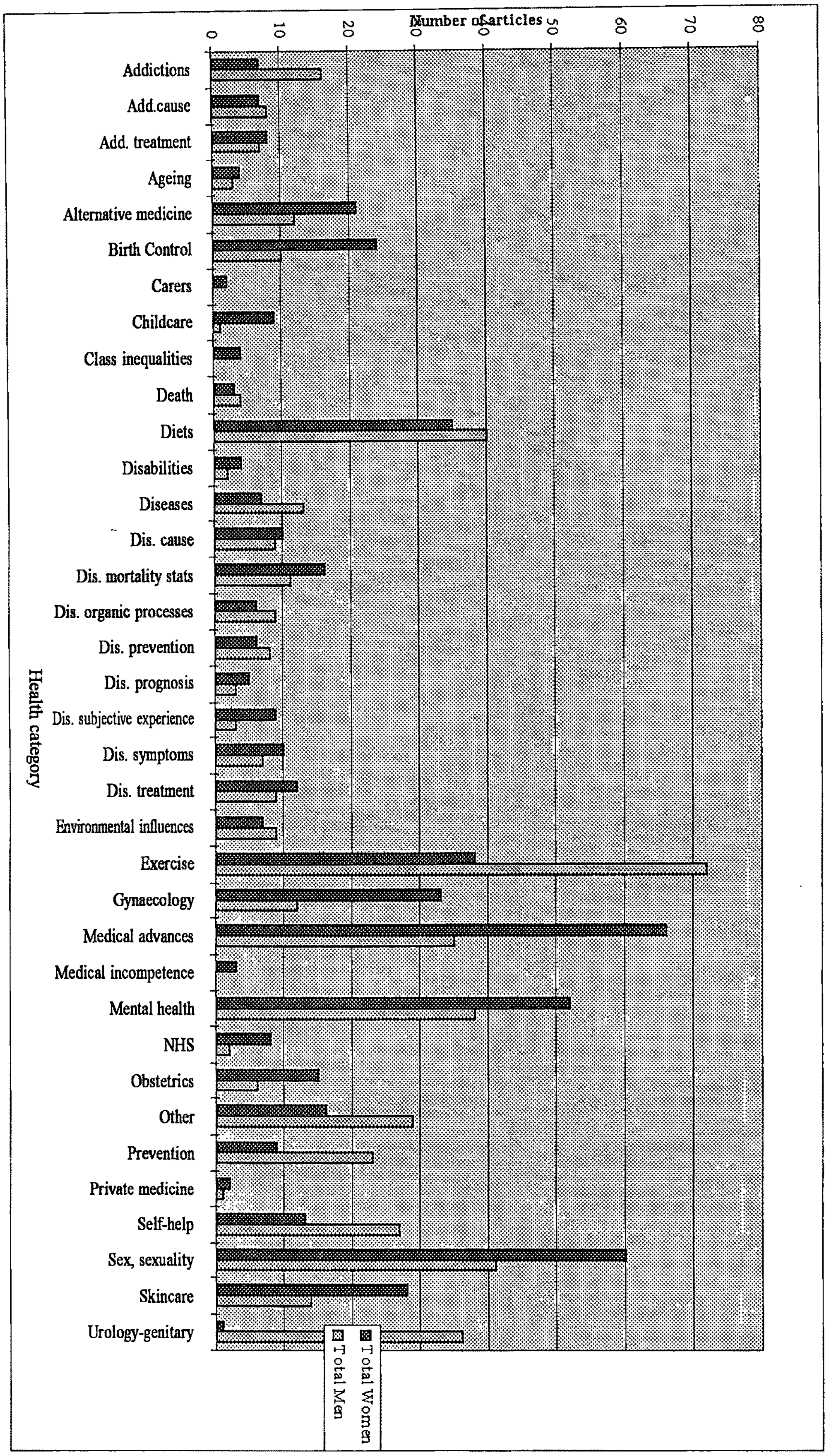


Figure 43: Health categories

categories were medical incompetence and carers which both scored no articles at all.

Perhaps unexpectedly, in the case of diets men scored more articles (40) than the women's group (35).

However, the men's group covered more articles (29) than the women's (16) which did not fit into the pre-assigned categories. As previously stated, full lists of these other topics can be found grouped by magazine in Graham[44].

Figure 44: Sources of health information

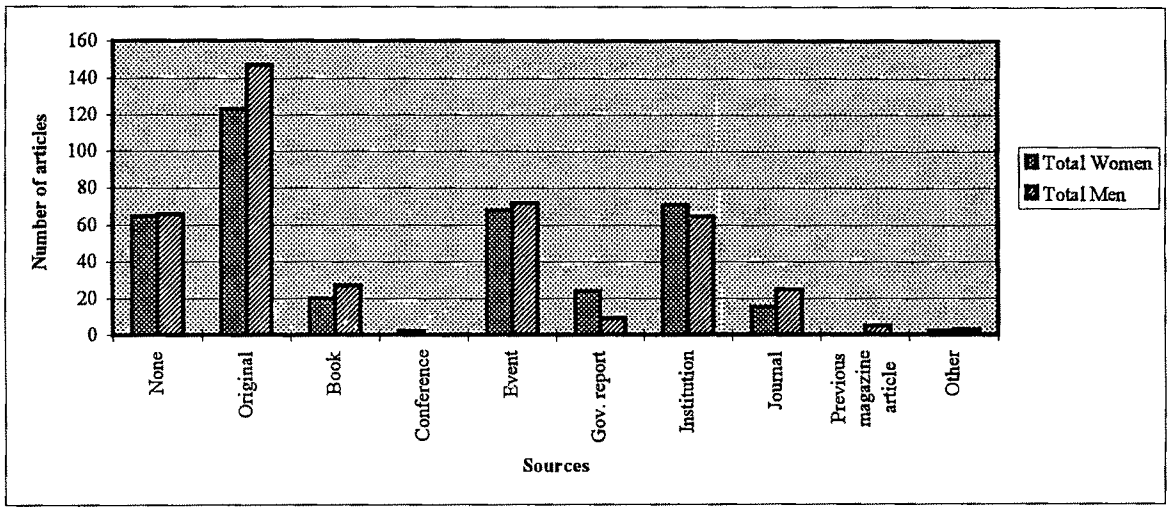


Figure 45: Types of persons quoted in the health articles

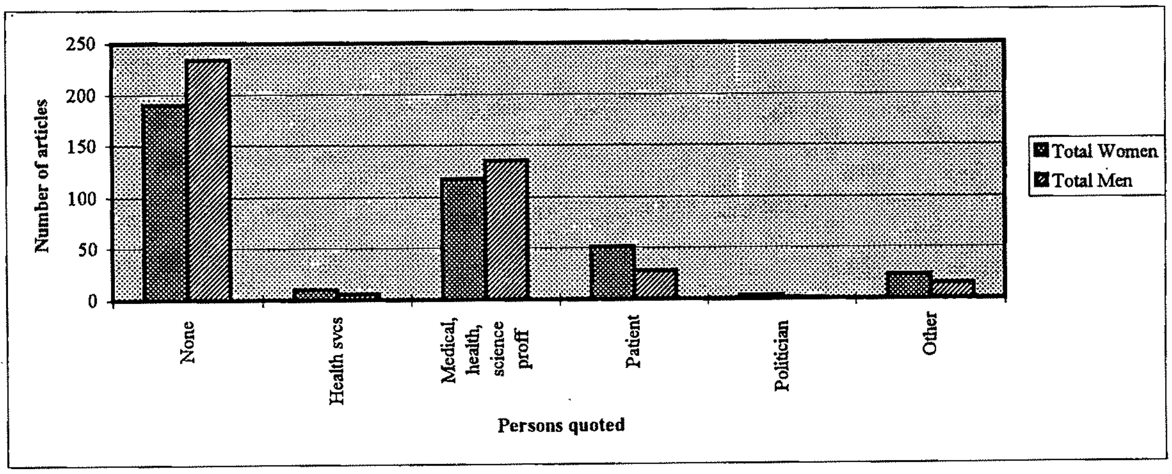


Figure 46: Jargon and definition of unusual terms

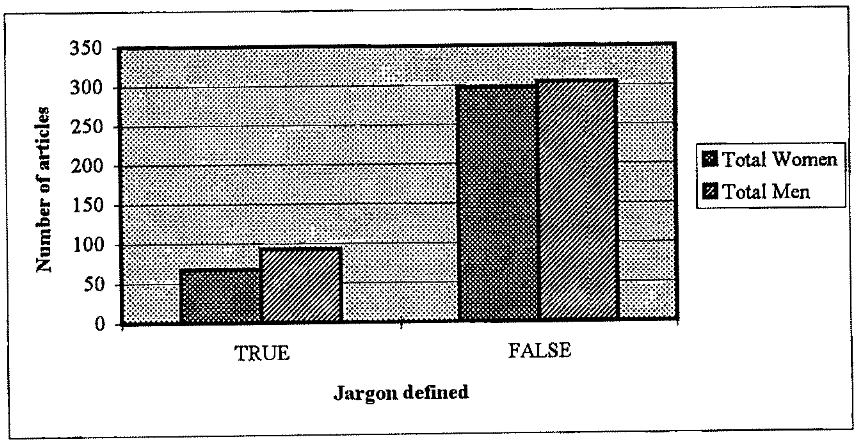


Figure 44. Both men and women's magazines appeared to have a majority of health articles which were original rather than with attributable sources. However the women's group had a large number of articles which sourced institutions (71) as opposed to the men's group which sourced events (72) more than any other type of source.

It is also of note to see that both groups had large numbers of articles with no source given at all (65 for the women's and 66 for the men's).

Women's least used type of source was the previous magazine article, scoring zero, whereas the men's was other types not covered by the pre-assigned categories. These other sources, including, for example, BUPA leaflets, are listed in Graham[44].

Figure 45. 48% of health articles in women's magazines and 56% of men's did not quote any type of persons. When a type of person was quoted the main type was a medical, health or science professional with women's scoring 30% and men's 32%.

In both groups the politician or government spokesperson was the least quoted type of person figuring in three women's articles and only once in the men's.

Figure 46. 82% of the women's group, and 77% of the men's, did not contain jargon, and therefore did not need to define any unusual terms.

Figure 47. A clear majority of articles (190) in the men's group provided direct advice as the main form of practical help followed by none at all (139). The women's group main type of practical help was none (143), followed by direct advice (131).

Both groups used all the pre-assigned categories for their practical help, with other forms scoring zero. However of all forms of practical help the availability of extra free printed information was the lowest scoring 20 articles in the women's and 18 in the men's.

Figure 48. Both the men's and the women's magazines favourite size of illustration was the less than one quarter of a page with 142 articles and 102 respectively. The second size type for both groups was no illustrations at all, while the women's group used the whole page (94) more than the men's (15).

Figure 49. 81% of health articles in women's magazines and 64% of the men's, were aimed at

Figure 47: Practical help

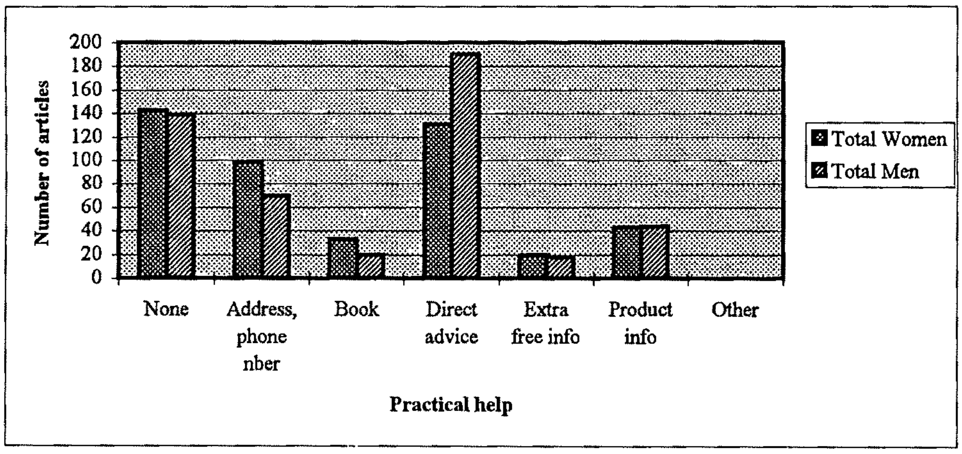
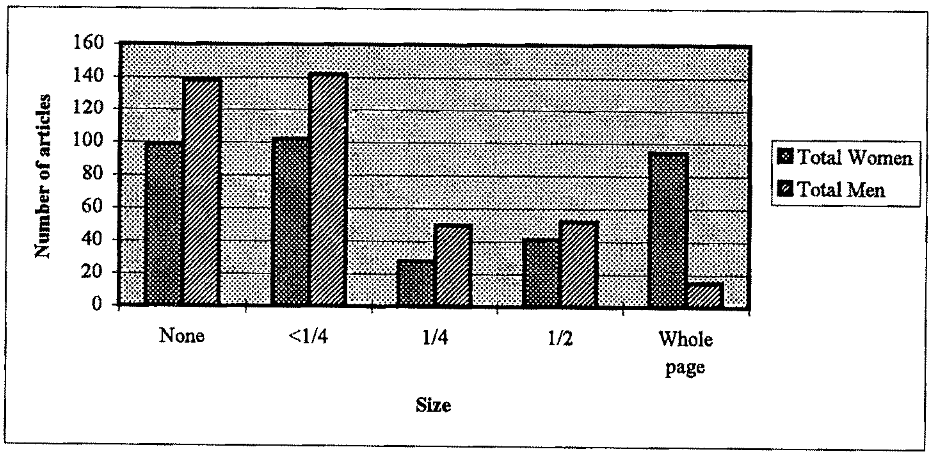


Figure 48: Relative sizes of illustrations and pictures accompanying the health articles



everyone. For both groups, the older children, adolescents, and elderly categories did not score anything at all. 15% of women's articles and 34% of men's were aimed at adults.

Figure 50. 75% of articles in the women's group were aimed at women, with only one article being aimed directly at men, and 24% of articles being aimed at both sexes.

81% of articles in the men's group were aimed at men with no articles being aimed directly at women, and 19% of articles being aimed at both men and women.

Figure 51. The majority of articles (225) in the women's group were about female adults, whereas the majority in the men's (231) were about male adults. In both groups the second highest type of main subject was none given. However, women's magazines provided the widest range of main subject types, with all pre-assigned categories scoring small numbers of articles. On the other hand, the men's group did not discuss infants or children at all, and only discussed adolescents once.

3.4 Interviews

3.4.1 Interviews with health editors from two men's magazines

The analysis of the interviews with two health editors from two of the men's magazines in the sample is outlined below, with further detail given by Graham[44].

From the two interviews, there were several points on which they agreed:

- They did not have a health policy for their magazines.
- They obtained their sources from similar organisations such as PR agencies and health organisations.
- They agreed that there was a lack of events in men's health and that this would contribute to the more issue oriented approach in men's magazines than women's.

However, there were also a number of areas on which the editors disagreed:

- One editor claimed to be conscious of sometimes targeting women in their articles, whereas the

Figure 49: Relative ages of the target audience

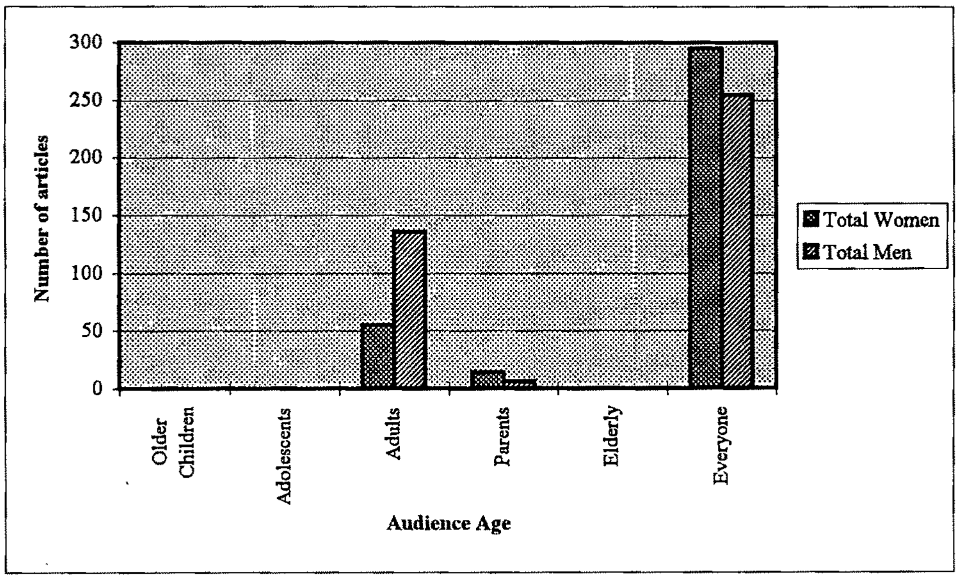
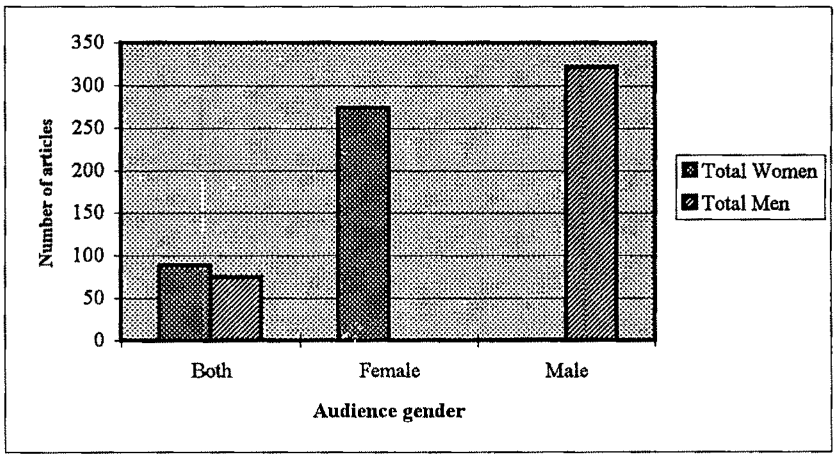


Figure 50: Gender of the target audience



other did not. Both magazines were found to have a proportion of articles aimed at both men and women.

- With regard to source attribution one editor stated that their magazine did not think it valuable for their readers. The other editor thought the opposite, and reported that their ethos was to inform the reader as much as possible.
- A final point of disagreement was in the qualifications of the editors. One was not health trained or educated, and the other did have a fitness background.

3.4.2 Interviews with health editors from two women's magazines

The analysis of the interviews with two health editors from two of the women's magazines in the sample is provided below; again full details are in Graham[44].

During the course of the two interviews there were a number of points on which the editors agreed and disagreed.

Points of similarity:

Both editors had high levels of compatibility on where their obtained their sources.

- They also concurred on the unexpected finding of no persons quoted. The editors thought that this was unusual as all their features, but not usually their news items, did quote experts.
- The editors of both these magazines also did not have any formal health or science training, or qualifications.

Points of divergence:

- Editor one stated that their writing policy and orientation was a conscious targeting of their audience, whereas the other claimed that they had no writing style policy for health, just a style guide for all the articles in the magazines.
- Editor one explained that they had a policy of providing positive health information to their readers and attempted to cover a wide range of topics. Editor two was unaware of any kind of health policy for their magazine.

4. Discussion

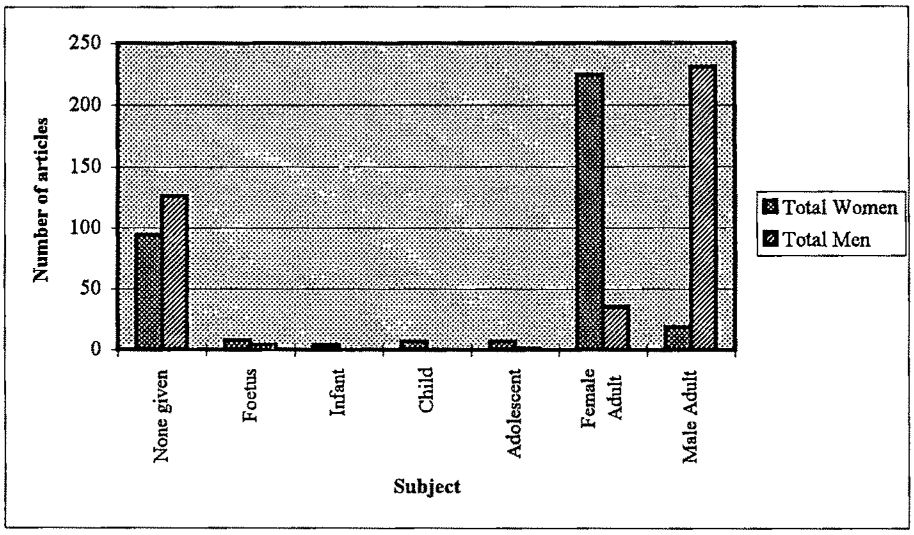
This study set out to examine whether health coverage in women's magazines was different to that in men's. To this end a large set of criteria was constructed to judge the different aspects involved in health coverage (see section.2.4). The analyses of the results obtained can be seen in section.3. Analyses of the differences between individual magazines are also provided in sections 3.1 and 3.2, as are the interviews in section 3.4 This section will discuss the significant variations between the health coverage of men and women's magazines, as shown in section 3.3.

4.1 Significant findings

The main finding for the differences in coverage was in the health topics themselves. Men's magazines' most frequent topic was exercise, whereas women's was medical advances. This somewhat unexpected result, that women's magazines should feature medical advances as their top health subject, also surprised some of their health editors. However, the men's health editors did confirm that exercise and fitness were on their lists of health subjects to be covered.

What is perhaps more unusual is that for the subject of diets, men's magazines came higher than the women's. This difference could be accounted for by the fact that men's diets and nutrition is a prime target for improvement. Men's diets have traditionally tended to include a large consumption of fatty foods and alcohol. Today, one of the biggest killers of men in the UK is atherosclerosis and heart disease, which may be ameliorated by a better diet and reduction in alcohol consumption. To this end, per-

Figure 51: Main subject of the health article



haps, men's magazines are putting a great importance on promoting healthy eating.

A further noteworthy finding was that both men and women's magazines second most covered topic was sex/ sexuality/ health. One would have expected this result for women's magazines, but not for the men's group. Due to the recent Health of the Nation Targets it was expected that men's magazines would show a much larger coverage of preventative health than was found. None of the health editors could explain this result.

As for the health subjects not covered by the men's magazines, it was interesting to note that the health editors claimed not to have a policy of excluding certain topics. In fact, none of the editors interviewed seemed to think that their magazines had a policy about health coverage. In general, no thought seemed to be given to the orientation or style of the articles, other than the fact that they had to conform to the house style of each individual magazine.

Interestingly, men's magazines appeared to be much more issue oriented in their treatment of health information than their female counterparts, although both groups had the majority of their coverage deemed to be written in an educational informative writing style, as shown in section 3.3. One would have expected women's magazines to be less educational informative than was found, since their orientation was less issue based. In response to this, the male editors seemed to think that their magazines treated health in a much more rational and informative manner than women's. This view is supported by the findings above, and also by the fact that women's magazines were much more prone to being sensationalist that men's. However, this does not explain why men's magazines had much more human interest articles than the women's group.

Another significant finding was that despite women's magazines being larger than men's, men's magazines over the period of study produced more articles and items on health than the women's. Several of the magazines showed peaks in specific months, but none of the editors thought that this was a common pattern. In fact, it is thought that if these magazines were studied over a longer period of time the peaks would flatten out. Nevertheless, despite women's magazines producing fewer articles, their percentage of health coverage throughout the magazines was two percent higher than the men's. This could be explained by the fact that women's magazines provided more lengthy health articles than the men's magazines, thereby increasing the number of health pages in the magazines, but not the number of articles. This reasoning is further supported by the data shown in Figure 40, which shows that women's magazines produce many more articles in feature format than the men's.

Another feature of note was that about 20% of health articles in men and women's magazines appeared to target both sexes. Some of the editors felt that this was just accidental, whereas others admitted that they knew their magazines were read by the opposite sex and sometimes did bear this in mind while writing articles. This shows that men and women's magazines are perhaps less gender specific than was previously thought.

As seen in sections 1.2 and 1.3, the media have an important role in influencing health behaviour. The so-called mobilising information types (sources, persons, jargon and practical help) are vital in the assessment of the health information provided by the magazines.

The first type of mobilising information studied was the types of sources provided in the health articles or items. Both groups used all types of sources to a greater or lesser extent. These varied more between the individual magazines than in the two groups as a whole. From the interviews, it became clear that the attribution of sources had varying degrees of importance depending on the gender of the target audience. For instance, both the women's health editors felt that giving the sources in the articles was valuable to their readers, whereas the men's felt generally that their male readers would not be interested in the exact sources of the information. However, in all cases editors made sure that they kept a record of their sources, in case readers questioned them. Moreover, the editors who stated the value of citing sources were supported in this by the large numbers of journal titles quoted as sources and shown in Graham[44].

With regard to the second aspect of mobilising information, persons quoted, both groups again quoted similar types of persons. Although it became apparent from the interviews that men's magazines found experts more valuable than patients, women's magazines felt that their readers' experiences were equally important in health articles, and therefore used them fairly regularly. This would also account for the finding that women's magazines were more sensationalised human interest in writing style than their male counterparts. Since all the health editors used a wide range of sources, from PR companies and health organisations, to scientific journals themselves, it is perhaps not surprising that the types of persons quoted also varied enormously. In some health articles, policemen and footballers were quoted alongside health experts, as shown by Graham[44].

On the other hand, the amount of jargon used in the health articles was reasonably low at about 20% for both groups. This is perhaps an anticipated finding, since these magazines are aimed at a generalist market and one would therefore not expect them to have any jargon at all. Furthermore, it is conceivable that because these magazines are also aimed at an educated audience, a certain amount of defined jargon would be permitted by the editors.

Finally, the most important aspect of mobilising information studied was the type of practical help provided by the magazines for their readers. Unusually, despite the women's editors clear attitude towards informing their readers as much as possible, the results over the period of study showed otherwise. Indeed, the women's group provided less practical help than the men's group in two ways: they had more articles giving no help at all, and they had fewer articles giving direct advice. This finding also supports the previous comments from the men's health editors that their magazines provide better information for their readers to act upon.

4.2 Implications of this study

It is possible that some of the similarities in these results can be explained by the fact that all these magazines are upmarket and essentially target similar social classes and ages. One would therefore expect certain health issues such as death or disabilities not to be covered much, as there is an implicit assumption that these subjects would not match the readers that the magazines are targeting.

However, can the differences found between these magazines be solely explained by the gender of their readers? Men's health issues are still very much in their infancy, but despite this their approach to the portrayal of health is much more reasoned and informative than women's. This is in spite of the claim made by women's magazines that women's health is a central part of their lives (and the magazines), and that it should be represented in an educational and useful way. Unfortunately, the results indicate a tendency to do the opposite. In reality, men and women's health are equally important, and care should be taken for both in how health information is depicted.

Indeed, since these magazines are for their readers the principal source of health information, should they be expected to have a real responsibility towards their readers? Should such magazines be held accountable for their characterisation of sometimes complex and confusing health issues?

A worrying finding of this research is that these magazines are very reliant on PR companies for health information, and this was reflected by the levels of product information given as forms of practical help. It is possible therefore, that their health information is merely a way of pushing products onto their readers in a more insidious form to direct advertising.

A further factor which affects the credibility of these magazines is the reluctance of some to quote explicit sources or experts in the field. The attitude that readers won't be interested in such information reflects an irresponsibility in some of these magazines towards really encouraging their readers to change their health behaviour.

A final consideration in the trustworthiness of magazines to their readers is that the majority of health editors or writers for these magazines have little or no training, qualifications, or experience in health or science. Indeed, one editor commented that 'a good journalist is supposed to be able to write about anything'. Only one of the interviewees had a health background and from other remarks it is clear that the norm for health editors and writers is not to have a health background. Nonetheless, it seems that ambiguous articles are checked by experts known to the magazines or health editors, and some of the women's magazines go so far as to have every article checked for accuracy.

This does show that despite, or perhaps because of, the lack of qualifications or training, some of the magazines ensure that the health information they provide is assessed by a qualified or trained expert.

5. Conclusions

There is now such an enormous interest in promoting 'good' health behaviour to the general public, that there is practically no form of mass media that does not have a health or science section, or series of programmes. The advantages of encouraging people to change their health behaviour are vast, both for financial reasons and people's well-being in general.

In the campaign for better health, men and women themselves have acquired a thirst for information that the mass media is trying to satisfy. It is therefore of great importance that the mass media, which are usually not experts in the health field, are assessed for their provision of health information. Currently, there is little evidence that any such examinations are taking place on a regular basis.

However, this study has created a framework for other such investigations, and has explored the health information in some men and women's magazines. The results on the whole were encouraging, despite certain differences in coverage between magazines. In general, these magazines provided high levels of mobilising information and wide ranges of health topics for their audiences.

Nonetheless, with the general public becoming increasingly educated in health matters, and expecting high levels of accuracy, there is a need for these magazines to develop a more consistent and structured policy towards their health coverage. For example, more comprehensive sources, and treating health articles in and out of the health sections in the same way.

Readers rely heavily on these magazines as sources of health information and may perceive them to be 'all-knowing'. In order for this trust not to be abused, health policies, and even an increase in health qualified editors, should be developed.

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Aslib

PROCEEDINGS

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Aslib Proceedings, vol.49, no.6, June 1997. pp.149-172

Editorial

By the sort of happy coincidence that lifts an Editor's heart, the papers offered for this issue of Aslib Proceedings fell in to two neat groups, in each of which two papers contrasted each other. Those who believe that this juxtaposition is deliberate are crediting the Editor with powers to which he lays no claim.

The first pairing consists of Bill Jupp's paper on the experiences of making six journals from the 18th and 19th centuries available on the Internet; and Keith Hart's summary of a paper concerned with the processes of putting contemporary journals on CD-ROM as a publishing medium.

In each case there were similarities, but also marked differences. Of the latter one of the most notable was that copyright was not an issue for the early journals; whereas for the contemporary journals the author points out that many publishers today are still only dimly aware of copyright. They have no real working understanding of what it means for them. Another notable difference is that with the early journals there is a need to ensure that the original, even if inaccurate in itself, is accurately represented. For contemporary journals the concern is that the substance of the text should be accurate – representation of the original is of little consequence except for illustrations.

The more mechanical similarities lie in the areas of the technologies used for data capture; and then the technologies used to provide searching. Only a few years ago searching would have been through relatively crude mechanisms such as inverted file indexes, with Boolean logic as an added attraction. A 'sounds-like' or Soundex algorithm to embrace misspellings was an occasional luxury. Now we have fuzzy logic that can cope with several sources of inaccuracy and ambiguity: mis-scanned words and letters, poor quality original text, spelling errors in originals, spelling errors by searchers, and errors resulting from the scanning process. Shortly we can expect neural net architectures to become commonplace. These might finally deliver something like the 'sense' or 'meaning' checker to complement the mundane spell checker. Neural nets promise more in this direction than might ever have been delivered by earlier context checkers that embodied attempts to codify grammar.

It is intriguing to note that the twinning of indexing from ASCII text with the display of the scanned original is common to both the early journals and to modern office automation document management systems.

The other pair of papers in this issue deal in very different ways with the skills with which information professionals of the very near future should be equipped. The paper on the Malaysian view of competencies required has distinct echoes of two fairly recent activities in the UK: defining competencies, and levels of them, for National Vocational Qualifications (NVQs); and the work of the Institute of Information Scientists (IIS) in redefining the criteria for information science.

As the tools of information become more complex but also more widespread, it becomes more and more difficult for the information profession as a whole to say what it is that makes it distinct. As a profession it lacks any great central theorem around which its knowledge is shaped. There is no E=mc2 against which the axioms of information acquisition management and delivery can be evaluated. It is insufficient to attempt to fall back on the gnostic 'we know best how to do it – trust us' since there are clearly so many information users who do not even hear that call, let alone consider it's merit.

Submission of papers

Papers submitted through e-mail are very welcome, but at present the technology is its own worst enemy. Transmission of text, especially coded text, through the several computers necessarily involved in an e-mail transaction inevitably results in some corruption of the original. In a number of cases recently it has resulted in the original being rendered totally unreadable.

Contributors wishing to submit material via e-mail are asked to ensure that, whatever other version they may send, they also send a plain ASCII file. One day all systems will communicate seamlessly with each other. We are not there yet.

Peter Gillman
Editor

The Internet library of early journals

Bill Jupp
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Paper presented at the Aslib Electronics and Multimedia Groups Annual Conference, 14-16 May 1997.

Abstract

A brief overview is provided of the different approaches available for the digitisation of library materials, which indicates the benefits and shortcomings associated with these techniques. It is from this perspective that the reader is introduced to the relatively new rationale behind the Internet Library of Early Journals which is mounting material drawn from six 18th and 19th century journal titles. A large corpus of material is required to attract scholars to an electronic archive of this nature and the project aims to mount 120,000 page images. Pages are scanned from both paper and microfilm originals; the paper volumes using a Minolta PS3000P overhead scanner and the microfilm from a Meckel MX500XL-G. The requirement for high volume, high throughput, low cost production of images excludes labour-intensive operations and the images are simply OCRed without manual correction. An Excalibur EFS database is used to provide full text fuzzy searching of the uncorrected OCRed text. The project has just started full production and the author discusses the findings so far.

Introduction

The Internet Library of Early Journals is a two year collaborative project by the universities of Birmingham, Leeds, Manchester and Oxford and funded within the Electronic Libraries Programme (eLib). The project (ILEJ) is due for completion in mid 1998 when a full report will be made available. The intention is to create a full text resource of 120,000 digitised pages, with indexes, of substantial runs of three 18th and three 19th century journals, to make these available as widely as possible to the academic community, and to evaluate both the technology and user perception. The journals selected are Notes and Queries, Blackwood's Edinburgh Magazine and The Builder from the 19th century and The Gentleman's Magazine, The Annual Register and Philosophical Transactions of the Royal Society from the 18th century. To date, the first title Notes and Queries is available and can be accessed at URL http://www.bodley.ox.ac.uk/ilej This paper aims to give an introductory overview to the possible approaches to digitising library materials in order to show the complex and often conflicting decisions that have to be made. From this perspective the decisions made within the ILEJ project are introduced and located within the digitisation spectrum.

Full text resources

Traditional library computational aids (eg. catalogues, databases) have provided the researcher with a list of bibliographic references. She must then take this list to the shelves or to inter-library loans to gain access to the physical material. Of course both of these options may involve delays, waiting for another user to return a book or awaiting delivery from another library. This model, in which the electronic data is solely bibliographic and simply references the physical paper material, is now changing with the availability of full text resources stored electronically. The decrease in the price of computing power means that it is now cost effective to store complete texts electronically, providing both new benefits and new challenges to the user.

The advantages of full text relate primarily to access. Immediate and universal access to the material can be provided without delays. But also of major benefit is the enhanced access to the text itself: the ability to search a complete electronic corpus almost instantly; the opportunity for automatic textual analysis and the facility for electronic documents to be linked directly to other relevant resources (for example, the British Library Electronic-Beowulf which provides linkage between three versions of the text[1]). The benefits of electronic full text are such that these resources are proliferating exponentially through the library world.

Approaches to creating a full text resource

The benefits to the researcher of course bring difficulties for the librarian, or at least difficult decisions. There are many different approaches to providing a full text resource and it is not clear at this stage which techniques are the best for which types of material: it is a time of experimentation. Indeed the Internet Library of Early Journals is just such an experiment. The following paragraphs give a brief introduction to the different approaches that have been taken by different projects, and hopefully highlight the complexities of the whole digitisation question.

Text Files

By far the simplest method of providing an electronic full text resource is simply to make available a text file. In the instance where the original document was created electronically, it is a trivial and low cost process to make it available for download and searching etc. This method also has the advantage that the user is seeing the original text as delivered by the author without the involvement of any conversion process; what you see is what the author wrote (WYSIWAW?). There are still issues of presentation with this scenario (are you viewing the document with the correct font etc.) but the integrity of the actual text is assured. Difficulties with digitisation begin to arrive when making available material that was not created electronically. The ILEJ project, for example, faces this difficulty in its focus on 18th and 19th century texts. Again, the most straightforward solution would seem to involve simply typing the text into a computer. This, however, can be an expensive process and, perhaps more importantly, is prone to include typing errors: the researcher is no longer guaranteed the integrity of the text. What you see may NOT be what the author wrote.

It is possible to increase the typing accuracy by having the text entered by two or even three typists and to compare the results electronically, correcting any mismatches between the different texts. This will assure an almost, but not guaranteed, perfect rendition of the original. But imagine an etymologist finding an example of two different spellings for the same word in an electronic text. Can she be assured that it accurately represents the original text as written by the author? But further, imagine the cost of three typists entering all your data! Retyping the original document is an expensive process that is open to errors; nevertheless, very large resources of older material are becoming available to the user community, on CD-ROM or via the Internet using exactly this technique. Chadwick-Healey's very valuable English Poetry and Patrologia Latina[6] have been made available using this technique.

Digital Images

However, a further benefit of the plummeting price of computing power means that the processing of large computer images is now cost effective and can provide an alternative method of delivering full text resources. Instead of typing in the text, the original page is scanned and the user is presented with a computer image rather than a text file. The advantage is that it is much quicker and cheaper than having each page hand typed. Also, the integrity of the text is assured because the user views an image of the original page. Our etymologist can now sleep peacefully at night. The fundamental problem with this method is that at present it almost always involves dismembering and trimming the originals so that they can be fed through a sheet feeder into a flatbed scanner. If there is a sufficient margin they can of course be rebound, but this adds significant cost to the operation. In most cases the original volume is simply discarded with the electronic surrogate becoming the primary resource. Discarding the original volume raises many further problems and expense. The original is lost so the value of the original over and above the electronic version must be accounted for.

No matter how high a quality of scan is achieved, information available in the original will be lost. Imagine an individual researching the history of paper manufacture: no information for her in an electronic image. Not only is there an inevitable loss of information but there are also the costs of maintaining the now primary electronic version. And the fact that the electronic version is the primary source, itself increases its cost as the electronic copy must be of an archival quality that can fulfil all potential future uses of the material. This requirement increases storage costs because higher quality images involve larger file sizes and therefore larger disks or longer tapes or more CD-ROMs on which to store them. Further, the costs of maintaining an electronic archive for long periods into the future will be considerable.

Simply backing up the material onto magnetic tape and storing it in a cupboard will not suffice. Will you have the correct format tape drive available in 10 years time? Will you have the correct software to read the images? Will you have the correct computer hardware/operating system to run the software? Is the integrity of the media dependable for that period or will you need to refresh the data onto new media after a fixed number of years? The costs of maintaining electronic data are considerable and must be costed when considering the destruction of the original.

In large digitisation programmes this cost can of course be offset against the resources freed by the destruction of the original, eg. shelf space in buildings with expensive reinforced flooring etc. Having said all this, destroying the originals and storing the data in electronic form is still a viable method of creating a full text resource, particularly where the original is already deteriorating; Cornell University has pioneered the methodology for this approach[4]. A variation of this method is to store the primary copy on microfilm rather than electronically. This has the benefit of not being dependent on the highly dynamic changes of computer technology; a microfilm can simply be stored in the cupboard and retrieved again in 10 years time. Equipment to read (or scan) microfilm will still be around. This hybrid approach of providing an electronic copy for access and a microfilm copy for archive removes a lot of the expense and concerns of maintaining the digital images. Yale University is active in developing methodologies for converting microfilm to digital images[2].

Indexing Digital Images

Assuming that all these difficulties have been successfully accommodated, there are still problems associated with a full text resource of digital images. Firstly, image files are significantly greater in size than text files that have been typed. Not only does this increase storage costs but it also increases download times which can be significant in a networked or internet environment. This may involve a reader spending long periods waiting for delivery and the associated frustration. Secondly, having page images is all very well but haven't we lost the second of our access benefits which initially prompted the urge to digitise: the ability for full text searching and electronic analysis? In some situations, availability of the originals is so restricted that access is worthwhile in itself. This is particularly true with very valuable material such as medieval manuscripts, but can also be useful if the material is less valuable but physically remote. The Research Libraries Group Studies in Scarlet collection[9] for example, is mounting some unindexed images. But generally a collection of pages that have simply been scanned are of little use to a researcher; they need the additional value provided by electronic indexes and full text to make those images useful. These indexes may simply be hand typed copies of the original indexes and contents pages but this fulfils only the first of our access requirements: immediate availability. In terms of opening up the text for further searching and analysis, this method offers no benefit over the original volumes. Deeper indexes can be produced manually but this of course is an expensive process. However, in some cases, such indexes have already been created by third parties and may be available.

OCR

The method of obtaining full text searching from digitised page images is to run the digitised images through an Optical Character Recognition program (OCR) which will create text files versions of the images which can then be searched. This is an automated process and OCR software is relatively cheap so the cost of converting large quantities of data is very low. However, the pitfall with OCR is that even with near perfect modern page images there will always be errors, the converted text will never be 100% accurate, and this accuracy drops considerably for older texts.

One solution is to proof-read and correct the OCR text and this approach has been taken by the eLib funded project ACORN[7]. However this final step adds an enormous workload to what has so far been an almost totally automated process. It is important not to underestimate the time consumed in proof reading and interactive editing. Unless the text is of very high accuracy it can often be cheaper to revert to the initial strategy of copy-typing the originals; interactive editing is much, much slower than direct copy-typing. But even after the most careful proof reading and editing, will our etymologist still be able to sleep peacefully at night?

The Internet Library of Early Journals

It is upon this difficult terrain that the Internet Library of Early Journals (ILEJ) set out to digitise 120,000 pages of 18th and 19th century material and make them available to scholars. Journal titles were chosen not only for their interest to scholars but also for the nature of their content. The Gentleman's Magazine, The Annual Register, and Notes and Queries all consist of short pieces on a wide variety of subjects, with lists of births marriages and deaths, book reviews and similar material. This eclectic content is impossible to index adequately and it was felt that full text searching would open up valuable information that had previously proved recalcitrant. Electronic free text searching would maximise the research value of this type of journal.

The nature of these titles means that their attraction to scholars could only result from a large 'critical mass' of material, a mass that would make consulting the resource worthwhile. Twenty year runs of each were seen as providing the minimum quantity capable of attracting scholars to the facility. For The Gentleman's Magazine, the intention is to digitise up to 100 years of material, since the availability of this title on microfilm offers the prospect of faster processing. This necessity for a large quantity of data was the primary fulcrum upon which project decisions rested; it characterises our whole strategy.

Our fundamental requirement was for high volume, high throughput and low cost conversion of large quantities of data. Such a requirement necessarily precludes any high cost text conversion, whether it be copy typing or proofing and correcting OCR. Images would therefore be scanned from original volumes and from microfilm and it is these images which would be displayed to the user. Hyper text indexes would be created for the images, both from existing electronic indexes supplied via third parties and by hand typing existing paper indexes and contents pages. But by far the greatest value would be added by OCRing the text to allow full text searching of material that would otherwise remain opaque.

OCR accuracy

Because the project ethos of 'high volume, low cost' excluded proof-reading and correcting OCR, the OCR would be left with errors. This means that the OCRed text files cannot be supplied as the primary data (as they are for example in Project ACORN) but would be used to provide additional value to the page images by allowing searching etc. The electronic library would therefore consist of linked pairs of image/text files in which a search can be made of the text files, but the original page image is supplied for consultation when a text match had been found. The advantage of storing image/text pairs is that, though the OCRed text may not be correct, the user actually consults the original page image and so integrity of the original is guaranteed. This model is in fact used by commercial office document management systems in which letters etc. are scanned on their arrival and the images retrieved later by a search through the OCRed text.

Because there was no intention of correcting the OCR it meant that, from the start, exhaustive searching of the material would not be possible; there would always be badly OCRed terms that a search would not find. It is this shortcoming that gives the Early Journals full text resource a different slant to comparable resources. The usefulness of the type of material digitised required a large corpus, and within fixed spending constraints this criterion has caused an associated (hopefully insignificant) reduction in retrieval. It our belief that our positioning in the cost/retrieval matrix is appropriate for this type of journal; that is, that scholars would prefer high retrieval rates from a very large corpus of data as opposed to 100% retrieval rates from a much smaller corpus. One of the aims of the project will be to evaluate the truth of this conviction.

Fuzzy Searching

In order to achieve as high a retrieval rate as possible, ILEJ is using the Excalibur EFS fuzzy searching software already in use by the British Library[1] and by Project Elinor at De Montfort University[8]. EFS is a search engine that allows the user to increase the degree of 'fuzziness' associated with their search. Increasing fuzziness will increase the number of hits found by returning not only words that exactly match the search term but also those with a similar spelling. This technique allows true matches to be found from terms that have been OCRed incorrectly. Fuzziness can be gradually increased returning more and more hits but with less and less correspondence to the original search term.

This technique will allow the user greater penetration into the corpus but at a cost; researchers will have to be more thoughtful in choosing their search terms and will be presented with a much greater quantity of negative research, ie. dismissing matches that are not relevant. Indeed, this whole paradigm will involve the researcher in developing new skills to successfully utilise this type of resource. In the good old days the reader would search through bibliographic data entered by trained librarians who had used controlled and standard language. However, anybody who has used Alta Vista to search the World Wide Web will be aware of the disadvantages of full text searching and the care needed in choosing search terms. A carelessly chosen term can involve the return of gargantuan quantities of irrelevant material. Although this problem of noise applies to all uncontrolled full text searching it is further exacerbated by fuzzy searching. Not only will fuzzy searching return badly OCRed words that are relevant, to the reader, it will also return similarly spelt words which are not relevant increasing the amount of necessary negative research. This factor adds another axis to our matrix: cost/retrieval/user-convenience. Again it will be part of the project to evaluate our position against these axes and make recommendations for further projects.

Because of the factors outlined above, successful techniques for negative research are paramount to the success of this methodology. As previously mentioned, one of the disadvantages of mounting page images as opposed to text is their size. A page image file, even when compressed, can easily be 20 times the size of the corresponding text and consequently delivery over the internet can be expected to be 20 times as slow. If a reader is having to sustain a handicap of this order purely in order to dismiss data that is irrelevant then there will be significant difficulties and frustrations in using the service.

Initially the project had considered using the OCRed text solely as a hidden search tool but it is now coming to be seen as an important resource for negative research. It is perceived that the OCRed text will provide enough context and be of sufficient quality to allow the reader to dismiss a page as not relevant. It is only when a relevant page is identified that the image is downloaded for consultation.

Scanning

The model so far describes high speed scanning and automatic OCRing to provide a high volume low cost resource. The only significant manual input has been the hand entering of the paper indexes and contents pages. Indeed, this is exactly the model for those titles scanned from microfilm. The microfilm rolls are fed into a Meckel MX500XL-G scanner which automatically moves through the whole film. However, to date, most of the scanning experience of the project has come from scanning bound volumes using the Minolta PS3000P overhead scanner. The age and value of the original volumes meant that dismembering was never considered. This decision limited the choice of scanner for paper originals to the Minolta PS3000P which today still remains the only hardware available for high throughput scanning of bound volumes. The scanner consists of a 'cradle', upon which the volume is placed open and face up, and the scanning optics which stand about eighteen inches over the cradle. The cradle is made up of moving plates which yield under the book's weight to allow it to be opened flat without stressing the binding. The operator simply holds the book open and presses a foot pedal to initiate the scan.

The use of an overhead scanner, although it removes any costs associated with dismembering volumes, significantly increases the actual scanning costs by requiring the full time attendance of an operator. In practice, the older tightly bound volumes used in the project required careful manipulation by the operator and throughput was considerably slower than the scanner specification. An average of about 80 pages per hour was typical; scanner operator costs are a significant factor with this type of equipment. The PS3000P is currently limited to bitonal 400 dpi which is not sufficient resolution for archival standards. Benchmark techniques developed at Cornell were applied to the ILEJ journals to determine the dpi required for full informational capture from bitonal scanning[4]. Examination showed that Notes and Queries and The Gentleman's Magazine had characters slightly under 1.0 mm in size which would require a dpi of 615 for full capture. Current technology, therefore, will not allow for the scanning of bound volumes to archival standards.

OCR in ILEJ

Omnipage Pro version 6.0 was the chosen software for OCR as it provided good recognition accuracy and a strong feature set including grey-scale and batch processing capabilities. The difficulties with assessing OCR quality (and this is an insoluble difficulty) mean that it is impossible to get accurate quantitative data without manually counting the words in the original. With older journals this problem is exacerbated as OCR is particularly sensitive to variations in type-weight, foxing, show-through etc that occur in this type of material. Because the quality of older material is so variable, any meaningful statistics on OCR performance would have to be aggregated over impracticably large quantities of data. It is therefore not feasible to come up with a single percentage accuracy of OCR across the large volume of material scanned. However, it has become clear that achieving high quality OCR is highly problematic in these circumstances and these problems are rooted in three different factors. Firstly, OCR packages are designed to OCR modern office documents using modern characters in modern fonts. Eighteenth century material contains long s's (ie. an 's' that looks like an 'f'), ligatures and diphthongs that are not recognised by OCR. Although OCR can, in a limited fashion, be trained to recognise alien characters, the recognition capabilities never match those achieved with standard text.

However, by far the greatest difficulties have arisen from the inconsistent quality of the original material. A page with dark type face and show through will be followed by one with faint type and broken characters. Some pages will be dark but with areas of light and broken characters. Pages will be skewed and columns can wander. Such variability does not lend itself to high volume processing. Ideally the scanning parameters would be adjusted to suit each page, but this is of course impractical.

The final problem area lies with the overhead book scanner itself. As previously mentioned, the limitation of 400 dpi prevents full capture which has ramifications for OCR quality. Also, the scanner currently only supports bitonal (grey-scale is expected later this year). OCRing grey-scale helps enormously with variable material as the OCR is able to 'ride' over the variation. But finally, the fact that the scanner optics sit 18 inches over an open book means that the image quality is never as good as that available from a flatbed scanner where the page is pressed flat against the scanner glass. Problems from uneven page surfaces, focusing and shadowing are inherent in the use of an overhead scanner.

Conclusion

This paper has, briefly, presented the various approaches available when considering the development of a full text scholarly resource. Subsequently it has shown the approach taken by the Internet Library of Early Journals and discussed some of the early technical findings of the project. The project can be understood therefore, as feeding back information into the digital community at two levels: short term technical data and long term methodological data. The project is gaining experience with state of the art scanning equipment, OCR and fuzzy searching software. Recommendations will be made about the benefits and limitations of this equipment and the techniques needed to reap the greatest benefits. This type of information is in immediate demand; people are making choices today about which type of scanner to purchase, which OCR package, which fuzzy search engine. Our expertise will be made available to help with these decisions. But in a year or two this data will be redundant as technology improves. However, the methodological implications gleaned from the ILEJ project will be more far reaching. Even with improved technology the decision as to where to locate a full text resource in the 'cost/retrieval/user-convenience' matrix will still be a pertinent one, in fact it may become more pertinent. As technology improves the difference in cost between manual production (eg. typing, proof reading) and automatic production (eg. scanning, OCR) will increase. It will become cheaper and cheaper to produce resources in the ILEJ mould, that is high volume but without full retrieval. The success of such resources will depend on the as yet unknown axis in our paradigm; how easily and how well will users be able locate the information relevant to their research. It is this component that may well prove to be the most interesting return from the ILEJ project.

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Electronic publishing on CD-ROM and the Internet: the experience of two special libraries

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Summary report of a meeting of the Aslib Computer Group on 28 April 1997.

The Librarian of the Royal College of Nursing (RCN), and the Library Manager of the Institution of Electrical Engineers, described their recent experiences of publishing their information electronically, on CD-ROM and on the Internet respectively.

Royal College of Nursing

Tony Shepherd of the RCN started by explaining that there are over 500,000 registered nurses in the UK, and that 300,000 of them are members of the RCN and therefore entitled to use the information services provided by his staff.

As the library has the UK's largest collection of specialist nursing journals, and most members do not get the opportunity to visit the library in person, in 1993 he undertook a pilot project to publish journal articles on a CD-ROM, making them accessible to individual nurses and to nursing or health organisations. After submitting a business plan and successfully bidding for funds the pilot project demonstrated the value of the product and in May 1995 Issue 1 of *RCN Nurse ROM* was released. The current version, Issue 5, was released in December 1996.

The project was conducted in partnership with Infologistix, an information management consultancy based in Nottingham, which used the *Personal Librarian* software package from Systematic Datasearch for text files, *Isys* for the DOS version, and Adobe *Acrobat* to handle the images.

Louise Smith of Infologistix explained that the tasks required to complete the project included data acquisition and conversion, producing the 'gold' (i.e. master copy) disc, design of the peripheral items like the user guide and disc labels, quality assurance and testing, and, within parameters closely set by the RCN, discussions on the marketing of the product.

The current version contains the RCN Library Journal database of over 100,000 journal articles (1985 – 1996), full text copies of *The Nursing Standard* (June 1992 – December 1996), *Nurse Researcher* (September 1993 – December 1996), *Issues in Nursing & Health* (30 issues, 1992-1996), and the RCN Library Subject Headings List (currently over 100,000 terms).

It was soon evident that the multiple sources of data were to provide more problems than purely technical ones. Most articles were from RCN publications and therefore relatively straightforward to prepare for electronic publishing as there was no copyright issue to resolve, except for a small number of images from the Science Photo Library and one or two other agencies and authors.

The images came from various places – some were embedded in the text of the articles themselves, some were held in separate software and file formats, and not all were available in any electronic form. These had to be scanned in from the published pages which produced its own problems as it was difficult to prevent show-through from the other side of the page and many of them were gray scale standard only. This accounts for the varying quality of images on the CD-ROM.

Other images, notably pictures sourced from external publishers and other libraries, were problematic because the suppliers were concerned to protect their copyright and to get royalty payments. It soon became obvious that some publishers are not in touch with the world of electronic publishing because the royalty sums originally demanded were often more than the sales price of the full CD-ROM. It is interesting to consider that negotiations with the Science Photo Library over approximately one hundred photos took about as much project management time as the rest of the data conversion task. In fact, the new format *Nursing Standard* now rarely includes photographs, which makes the data conversion and royalty issues very much simpler.

Technically speaking, most of the text was supplied on an Apple Macintosh disk, converted to *Mac Word* using Quark *Xpress*, and then into *Word* format for the IBM PC. Some data were already held in PC format. The journal references database was converted from a Unix system. All these data were then transferred to the CD-ROM with lists of text files and their related image files so that hypertext links could be set up correctly.

Once the discs were produced (one for each platform version – DOS, Windows 3.11, and Windows 95), detailed testing took place to check the functionality including printing and saving to disk as well as search and retrieval tasks. In addition, each record in each file had to be checked against the hard copy article to verify the content and consistency of data, and most time-consuming of all, to check the links between text and images.

Originally there was an Apple Mac version, which has now been withdrawn due to a combination of low sales and the extra work and cost to produce it. The *Personal Librarian* software was supposed to be able to handle Mac and DOS versions with no extra effort, but that proved to be too optimistic.

Tony Shepherd stated that although over 1,000 copies of the CD-ROM had so far been sold to individuals and institutions, the project was not totally self-financing and efforts were being made to reduce costs by sharing them with partners (other information providers in the field). This has led to a new project which aims to extend the range of information available and to improve the currency of published information by reducing the delay between hard copy and electronic version to about six weeks.

The new product was launched in January 1997 as the *British Nursing Index* (BNI) and is available in print, CD-ROM, and on the Internet. As the final issue of *RCN Nurse ROM* (Version 5) contains full text articles and some older references which will not be included in BNI, both products will be needed by nursing and health-care libraries for the next year to 18 months.

In summary, Tony Shepherd was pleased with the progress so far and felt that both products were valuable resources for anyone needing information in the nursing and midwifery sector. His warning for anyone about to embark on similar projects was "the devil is in the detail".

Further information on *RCN Nurse ROM* and *BNI* (including pricing information) can be obtained from the RCN Library ((+44) 0171-409 3333), or Louise Smith at Infologistix ((+44) 0115-967 7706).

Institution of Electrical Engineers

The second library to relate its experience was that of the Institution of Electrical Engineers (IEE), represented by John Coupland, Library Manager. The IEE library was formed in 1880 and now houses approximately 70,000 monographs and 1,100 journal titles, and serves 136,000 members.

The British Computer Society library was housed with the IEE collection in 1977 and full library services are offered to its 35,000 members. The collections of the Institution of Electronic and Radio Engineers and the Institution of Manufacturing Engineers were also incorporated into the library when they merged with the IEE in 1988 and 1991 respectively.

The stock is largely concentrated in the fast-moving subject areas of electrical engineering, electronics manufacturing and control engineering, computing, information technology, telecommunications and related areas such as physics, management and history.

The catalogue is held in a *CAIRS LMS* library system and all functions, including loans, acquisitions, serials management and inter-library Loans are managed by the system. The OPAC, whilst being highly functional, does not have a graphical user interface, and is available only to members who can visit the library.

John Coupland wanted to make this extensive catalogue available remotely to users who could not visit the library in person and three options were identified: to offer dial-up telnet access over the Internet; to change the library system; or to load the catalogue data onto a web server, making it available over the World Wide Web (WWW).

The first option would have involved an expensive hardware upgrade and would have offered a character-based interface not dissimilar to the existing OPAC, while the second option was seen as long-term and expensive, and one that would not widen access in any case.

Therefore the library worked with a supplier, Interactive Information, to convert the catalogue data into a format that could be used by the shareware search engine program called*freeWAIS-sf*, and made available over the WWW.

The project to convert the original records took three months from commission to launch of the new service and cost approximately £7,500. This included one year's support from the supplier. Overhead on the IEE web server is very small as the 70,000 records (monographs only) take up just 50Mb of disk space.

This service was launched as part of the IEE website in January 1996 and has never been out of the 'top 10' in the IEE website charts that measure the popularity of specific pages.

Every two months the CAIRS catalogue data is written to an ASCII file. This is sent via ftp to the web server, and indexed – a task which takes about one and a half hours.

The visitor to the web version of the catalogue has two options – a simple word search, or a controlled field search. The former is by far the most popular option.

Most visitors use the simple word search which prompts the user for a search term that might be found in any one of a number of indexed fields. A maximum number of matches can be specified and sort criteria can also be selected for each search. The system then returns a list of bibliographic details for items that meet the criteria.

Users can click on an item to borrow or reserve it, and after completing a simple form containing their name, IEE/BCS membership number, postal address, and any specific instructions, an e-mail is sent to the library to ensure that action is taken on the request within 24 hours. A follow-up e-mail is returned to the user to confirm that the action has been taken.

The controlled field search offers the same facilities but allows search terms to be entered field-by-field and includes a date range option.

The new service was launched by publicity in IEE newsletters, BCS publications, through press releases, and in leading journals for information professionals such as Aslib's *Managing Information*. In the first year there were around 1,300 loan requests via the WWW. 1997 usage is currently running at 230 requests per month. This is in the context of a total loans figure for the library of about 30,000 p.a.

John Coupland is aware that it is not an ideal solution – it does not show the live loan status of an item for example – but it has enhanced the service offered by the library at relatively low cost. The overall reaction from members has been very favourable. The next anticipated project is to add the journals holdings.

Anyone can access the catalogue over the WWW but only members can borrow items. The IEE Library Online Catalogue can be found on the IEE home page at http://www.iee.org.uk/. Further enquiries can be directed to John Coupland at jcoupland@iee.org.uk.

By way of summarising the meeting as a whole, from the perspective of the Aslib Computer Group and the delegates, it was interesting to note how individuals perceive the amount of effort required to produce information electronically, and the differences between the available media. Although many of the points raised were obvious (once they had been pointed out) the speakers provided a useful overview of the issues without labouring the points. It seemed evident that, with a clear objective and the rights of ownership, electronic publishing offers a good opportunity to widen access to materials held in a central location, and to enhance the image and reputation of the library and host organisation into the bargain.

These are significant benefits, sought by many special libraries, and the speakers are to be congratulated for sharing their experiences with their colleagues.

Defining competencies for special library professionals: Malaysian experience

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Abstract
Special libraries are undergoing some fundamental changes which require redefinition of the competencies of information professionals. The contextual variables necessitate identification of competencies in relation to the peculiarities of a situation. Some methodological improvements were also attempted to arrive at a reliable body of knowledge and skill competencies. Fifty top and middle managers of the ten largest special libraries in Malaysia were interviewed to validate competencies by using a scale indicative of the perceived extent of importance of each competency. The validated competencies have been presented in the following six areas: foundation, cataloguing, circulation, information service, collection development and serial control. Capabilities to relate information facility to the organizational mission and profile, managerial competence, effective exploitation of information technology, subject expertise, and a great deal of emphasis on service aspect figure as the most important arsenal for the future information professionals.

Introduction

Special libraries are undergoing fundamental changes in the face of contextual, structural and operational dynamics. The information professionals have to manage change by equipping themselves with new sets of capabilities in the fast changing work environment. Preparation of future information professionals, through formal and informal means, poses a serious challenge to those responsible for their education and training. Competency identification and validation are the viable means to reconfigure needed capabilities around which formal and informal education programmes should evolve.

Griffiths and King[1] provided an operational definition for competency as a generic knowledge, skill or attitude of a person that is related to effective behaviours as demonstrated through performance. **Knowledge** here means having information about, knowing, understanding, being acquainted with, being aware of, having experience of, or being familiar with something, someone or how to do something. **Skill** refers to the ability to use one's knowledge effectively. **Attitude** is the mental or emotional approach to something or someone. Competence is directly related to performance, effectiveness of performance, and the value of the performed work. The capacity to develop competencies is derived from education, training and experience. A competency is moderated by the rewards attached with performance and results of the performance in the form of services or products. The performance may have immediate effects on a situation, service users, or patterns of use, but it may also have long-term bearing and high order effects that influence the organisational mission, objectives and community, mostly in a distant, subtle or unconscious manner.

Competency validation is the process of establishing the need or lack of need of a specific competency. Validation can be performed by those who have the insight to judge the pertinence and need of a competency for the present or future needs. Validation can be performed by content validation or face validation by experts. Validation process renders identified competencies as valid and acceptable norms for future directions and projections.

The changes in the information market demand a fresh look at the competencies of future information professionals. Brittain[2] held the view that the emerging market is expanding rapidly while the traditional market of librarianship is showing no growth. He proposed that the new curriculum should be divided into primary, secondary, and tertiary competencies. The primary skills include: statistics, information retrieval, classification, natural language processing, logic, and application programming. The secondary skills are: data modeling, data presentation, decision-making processes, decision support systems, management budgeting, project management, simulation techniques, and aspects of expert systems. The tertiary skills are: structure of organisation, office automation, principles of accounting, procedures for procurement, and project management techniques.

Davenport and Cronin[3] had predicted a big differential between the corporate sector demands for the need of information managers and what the library schools could provide. They suggested the following strategies to address to this mismatch: shift of emphasis on employer-oriented training, change of role of professional bodies from validation to political support, a new industrial classification for information work, a revision of funding mechanisms, and vigorous marketing of library and information department as a training ground for managers. Moore[4] reported that the job market in UK was expanding and offered between 3000 and 3500 jobs at any time which were potentially open to librarians and information workers. However, the librarians face severe competition and will have to broaden their skills. For this purpose, the library schools had to redesign their curricula. He concluded that very few schools were equipping their graduates with the type of skills that are being demanded by the emerging job market.

Employer perceptions are considered a viable means to monitor market trends. Frank[5] discussed the role of librarians in a science-engineering library and urged that potential librarians must be able to communicate well, whether orally or in writing, and develop managerial potential. Some understanding of scientific principles and methodology and computer literacy are also essential. Thomas[6] described the role of the National Agricultural Library as an employer and observed that NAL's ideal candidate had leadership qualities, good communications skills, a scientific background, computer literacy, and capability to conduct independent research. Bowden, Bierschenk and Olivier[7] reported the results of a survey of 241 US medical libraries. Most medical libraries required staff who had an ALA-accredited MLS; expected a high degree of computer literacy, competence for database searching; and positive service-orientation.

A number of studies have focused on the competencies for special librarians. Cortez[8] traced the 70-year history of library education for special librarians and noted that the principles of information resource management had to be integrated with special librarianship for future library education. Tees[9] conducted a survey of 452 special librarians to identify competencies for entry-level professionals and found communication skills, reference capabilities, and positive service attitude as the most needed skills for future professionals.

Paris and White[10] surveyed heads of 108 special libraries to gather their perceptions about the existing curricula of library schools, continuing education, and on-the-job training. Interestingly they did not report any consensus on the core curriculum. However, a strong support for continuing education was evident. The employers considered on-the-job training a luxury that most special libraries could ill-afford. Green[11] surveyed 190 members of the Association of Independent Information Professionals and reported that diversity in skills was considered essential. In addition to strong interpersonal communication and searching skills, a broad range of financial, marketing, and management skills were required along with the capability to meet ethical standards. Cross and Richardson[12] determined competencies in the area of government information and reported that 82% of the respondents observed that library schools should emphasize federal and state government sources and online services.

Need for Competency Studies

Competency identification and validation processes provide an objective framework for the design of education and training programmes. These also provide guidelines for determining appropriate educational and training levels for intake and graduation. Education and training programmes can be evaluated against validated sets of competencies. Competencies also provide a sound base for manpower planning in a given field. The field of library and information studies has become quite uncertain in the face of multiplicity of inter-disciplinary connections, changes in the needed capabilities of the professionals, fuzzy demarcations between professionals and non-professionals, and confusion about appropriate education and training levels. A clear articulation of the sets of competencies required of the professionals can help, both directly and indirectly, in manpower planning and development.

It has been realized that no universal set of competencies can be defined or applied. The situational variables cause significant variations in time and space dimensions. The state-of-the-art of information technology, level of professional maturity, national priorities, and other local peculiarities require definition of professional competencies from the perspective of a given context. Definition of competencies in institutional context can provide a clear focus for the preparation of professionals for a particular type of library.

The manpower situation of library and information profession in Malaysia has many peculiarities in terms of minimal requirements for induction into professional education and practice, opportunities for formal education and training, levels of professional education, career advancement opportunities, and status of special libraries and information centres in the country. These factors prompted the study for identification and validation of competencies for library and information professionals working in the Malaysian special libraries and information centres. Some additional considerations included: (1) most of the competency studies, conducted during 80s, are

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now dated due to changes in the field; (2) almost all the competency studies were meant to articulate the existing needs and practices while manpower planning required a futuristic approach; (3) manpower planning required a focus on entry-level needs instead of covering all the professional strata; (4) since the behavioural component of competencies is based on judgments and results in endless lists of attributes without any tangible effect on the content of formal education programmes, it had little significance for inclusion in the competency definition exercise; (5) earlier competency studies used the methods of task enumeration or broad categorization of course offerings, both without any tangible units of performance, while there was a need to use natural units of performance for identification of competencies; and (6) there existed a need to establish the relative importance of each competency instead of seeking absolute validation as the experts tend to validate them considering their possible utility at some point.

Objectives

The primary purpose of this study was to determine sets of competencies of library and information professionals working in Malaysian special libraries or information centres for entry-level positions in order for them to perform optimally in the first five years after joining the professional fold. Two specific objectives were set forth: (1) to determine a set of foundation competencies for an entry-level library and information professional in the setting of a Malaysian special library; and (2) to determine sets of competencies for an entry-level library and information professional in the setting of a Malaysian special library in the following operational areas: management, information technology, information services, cataloguing, and serials.

The term *library and information professional* in this study refers to all those individuals who have acquired their undergraduate or post-graduate qualification in a formal education programme of library and information studies. The term *entry level* refers to the point of entry of a professional immediately after graduation from a formal programme of library and information studies. It was decided to exclude the *attitude* component of competencies as it is normally expected to remain stable for service professionals. Another consideration was that the listing of desirable attributes is judgmental and such compilations may have a great deal of diversity that would not yield any meaningful generalization.

Procedures

It was decided to interview middle and top managers of the ten largest special libraries and information centres in the country. It was assumed that managers with a minimum of 5-year experience would make realistic, objective and valid judgments in the validation exercise. Altogether 55 individuals were identified to participate in the study. The first step of the project, identification of competencies, was accomplished by the Project Team on the basis of review of literature and available models. The second step, validation of competencies, was achieved by conducting interviews of the selected participants. Identification of competencies was not attempted at the job task level. Rather natural units of performance requiring discrete preparation of professionals were selected. The following six operational areas were used to organize statements around them: foundation, collection development, cataloguing, circulation, information services, and serials. A scale of desirable extent of coverage of each competency was given against each statement, 1 indicating no coverage and 9 for exhaustive coverage. Different instruments were used for validation of competencies in the six operational areas by requesting the middle managers responsible for a specific area to validate the relevant set of competencies. The instruments were pilot-tested.

Each team member liaised with the chief executive of the participant institution for appropriate time of the visit. The team member supplied sets of instruments and instructions to the head of an institution at least one week before the visit with the request that these may be distributed among the participants and they might frame their opinion. However, they were encouraged not to fill in the instrument before the arrival of the interviewer. Validation was recorded on the instrument in the form of response on the scale for extent of coverage. Out of 55 identified participants, 50 (90.9%) were available for interview and validation.

Analysis

The validated competencies for professionals working in special libraries, both for knowledge and skills, are presented in the six categories of foundation, cataloguing, circulation, information services, collection development, and serials.

Foundation Competencies: Twenty knowledge and eighteen skill competencies, listed in Table 1, were validated in the foundation component. Among the knowledge competencies, highest importance was attached to organisational, contextual and management capabilities. Knowledge of the organisational structure and the role of information service got the highest mean score of 8.8. Other competencies rated highly from this group were the knowledge of: *establishing vitality of information service in the organisation* (mean=8.3), *information policies and procedures* (mean=8.22), *research and contractual undertakings of the organisation* (mean=8.10), *physical and manpower resources* (mean=7.56), *job responsibilities and work conditions* (mean=7.73), *functioning of organisational units and internal relationships* (mean=7.39), *institutional environment and change dynamics* (mean=7.39), *management capabilities like planning, decision making, marketing, public relationing, costing and budgeting, etc.* (mean=7.22), and *statistical analysis and interpre-*

tation (mean=6.11). Service orientation was the second highest rated competency. The respondents also rated subject knowledge highly and the two competencies related to general information resource development and development of specialized materials like standards, patents, reports, etc. had the respective mean scores of 8.28 and 7.25. Three competencies related to knowledge of information technology applications and automation received the mean scores in the range of 7.73 and 7.4. A high degree of importance was also noted for the knowledge of the developments in research and applications in the information field (mean=7.5). These results indicate the most significant knowledge capabilities for the future information professionals of special libraries.

When the skill component of foundation competencies is examined, information organisation, provision of specialized information services, and abstracting stand out in the list with the mean scores between 8.8 and 7.3. Three skills related to information technology use received different treatments; use of computers, house-keeping applications, and database design with the respective mean scores of 8.0, 7.44, and 6.78. Half of the skills were managerial in nature with team work and time management receiving high mean scores of 7.67 and 7.6. All other related skills had the mean scores in the range of 7.4 and 6.9. Obviously there is a much stronger emphasis on the knowledge component of management competencies as compared to the relevant skills. However, if both are viewed together, it appears to be the strongest and most emphasized segment.

Cataloguing: Six knowledge and five skill competencies related to cataloguing were validated for entry-level professionals (refer to Table 2). It is quite

Table 1. Foundation Competencies

KNOWLEDGE	
Statement	**Mean**
Structure of organisation and the role of information service in the organisation	8.80
Proactive information services to be initiated in a special library	8.40
Establishing vitality of information services in the eyes of top executives and key R&D personnel	8.30
Collection and related resources	8.28
Mission, goals and objectives of the organisation	8.22
Standards, policies and procedures affecting library and information services	8.22
Basic subject concepts and terminology used in the primary areas of interest of the users	8.10
Major research projects/programmes/contracts of the parent organisation	8.10
Job responsibilities and working conditions	7.78
Impact of information technology on libraries	7.73
Definition, structure, formats and dynamics of information	7.72
Automated capabilities and requirements for cataloguing, circulation, acquisition and serials	7.67
Physical and manpower resources available within the library	7.56
Current library developments and research related to information services	7.50
Available and emerging information technologies and their applications in information work	7.40
Functioning of different departments and their relationships	7.39
Institutional environment and the factors causing change	7.39
Specialized resources like standards, reports, patents, etc.	7.25
Management in areas such as planning and decision making, problem solving, organizing, marketing, public relationing, budgeting and cost analysis and evaluation of resources and services	7.22
Statistical analysis, interpretation and presentation	6.11

SKILLS	
Statement	**Mean**
Organisation of materials	8.80
Information and outreach services; current awareness services like SDI, content page displays, bulletin boards, demos, etc.	8.40
Use of computer and other information technologies in library operations and services	8.00
Working in teams	7.67
Information manipulation and repackaging	7.60
Time management	7.60
Abstracting	7.50
Use of computer in house keeping operations; word processing; graphics, spreadsheets, etc.	7.44
Data gathering, analysis and use of management information	7.40
Preparation of newspaper clippings and press releases	7.30
Planning and decision making; problem solving, developing programmes, budget preparation and fiscal management	7.30
Definition of problems, option exploration and decision making	7.28
Supervision; assigning; organizing; monitoring; directing; appraising; reporting	7.28
Coordination skills	7.22
Applying methods of measurement and evaluation in access services	6.94
Policy and procedure formulation	6.90
Database design, development and maintenance	6.78
Editing and publishing	5.93

KNOWLEDGE	
Statement	**Mean**
Cataloguing principles, rules, systems and tools	9.00
Cataloguing methods, techniques and products	9.00
Special cataloguing tools and sources in the primary subject area of the library	8.60
Cataloguing methods and techniques for non-print and other special materials	8.40
Systems and instruments for cooperative cataloguing	8.20
Philosophy, systems and strategies of information organisation and retrieval	8.13

SKILLS	
Statement	**Mean**
Application of cataloguing rules	8.80
Use of bibliographic utilities and their products	8.60
Managing problems of cataloguing outputs	8.20
Information analysis of documents	8.00
Interacting with other cataloguing systems and utilities	7.60

Table 2. Cataloguing Competencies

revealing to note that the top and middle managers of special libraries in Malaysia considered cataloguing knowledge absolutely necessary for the new professionals. Two competencies related to knowledge of cataloguing principles, systems, tools, etc. and cataloguing methods received the perfect mean score of 9.00. Competencies related to specialized cataloguing, cooperative cataloguing, and systems and strategies for information retrieval also received mean scores in the range of 8.16 and 8.13, quite high in relative terms. There is a corresponding emphasis on the skill component for cataloguing. Four of the five competencies received mean scores exceeding 8.00 while use of cataloguing utilities received the mean score of 7.6.

Circulation: Six knowledge and four skill competencies, listed in Table 3, were validated for circulation function. The three knowledge competencies receiving mean scores of 7.25 and more were related to collection management, interlending philosophy and system, and access services. Knowledge of circulation control, access policies and procedures, and insurance received much lower mean scores. It is quite obvious that professionals are not expected to develop any intensive knowledge in these areas in the setting of special libraries. Again, among the skill competencies, only interlending contacts and use of management data received the mean score of 7.25 and 7.13, respectively. Promotional skills and safety aspects are not given as much importance in the setting of a special library.

Information Services: Evidently the information service component of competencies is the most substantial one with a high degree of importance attached to it. Among the eleven knowledge competencies, listed in Table 4, the top two were related to literature searching and specialized information services with the mean scores of 8.4 and 8.2, respectively. Knowledge of interviewing techniques had the mean score of 7.2. A great deal of importance was attached to the knowledge of information needs of the user community and capability of needs analysis (mean score=7.87). Provision of information services to the special library clientele is dependent on the knowledge of information sources, their evaluation, and the capability to procure or access them.

Four such competencies were related to knowledge of information sources in the subject field (mean=8.00), information resources in different media and formats (mean=8.00), information systems and resource sharing networks (mean=7.67), and publishers and vendors (mean=6.4). Knowledge of promotional activities received the mean score of 8.00, but user education in this institutional context is given much less importance (mean=6.4). Knowledge of information service philosophy and service prioritization had the mean score of 7.6.

Table 3. Circulation Competencies

KNOWLEDGE	
Statement	**Mean**
Collection management operations including stack management, use data and applications, weeding, binding and preservation	8.00
Interlending philosophy approaches, systems, tools and services	7.75
Scope and dimensions of access services	7.25
Circulation control system capabilities and requirements	6.75
Access service policies and procedures	6.25
Insurance of library resources and facilities; provisions and applications	5.50

SKILLS	
Statement	**Mean**
Developing contacts and capabilities for interlending activities	7.25
Use of management data for policy development and decision making	7.13
Promoting use of access services	7.00
Ensuring safety of resources	6.25

KNOWLEDGE	
Statement	**Mean**
Search strategy, information systems and searching tools using manual, machine readable and emerging technologies	8.40
Specialized information services like SDI, vertical file, content page, referral and other services	8.20
Information resources in the primary subject area of the users	8.00
Information resources; primary, secondary, tertiary in different formats and media	8.00
Promotional strategies for information services	8.00
User community and its information needs	7.87
Information systems and resource sharing networks affecting public services	7.67
Information service philosophy, scope, extent, strategies and priorities of the library	7.60
Interviewing techniques, analyzing and interpreting user requests	7.20
Key publishers, vendors and jobbers of reference tools in the primary subject area of the library	6.40
User education programmes	6.40

SKILLS	
Statement	**Mean**
Use of tools for searching information	8.60
Literature searching; manual and electronic	8.40
Development, management and maintenance of automation facilities for information services	8.20
Developing and maintenance of reference collection	8.20
Public relationing and communication skills	7.87
Preparing information newspaper clippings, press releases, etc.	7.60
Preparing information access guides, pathfinders, etc.	7.40
Developing and maintaining specialized resources like vertical file, in-house indexes, etc.	7.20
Developing policies and procedures for information services	7.00
Conducting user education programmes	6.40
Editing and Publishing	5.93
Promoting use of information services	4.10

Table 4. Information Service Competencies

A similar treatment to the skill component was noted where two literature searching skills were perceived to be the two most important capabilities with mean scores of 8.6 and 8.4. Use of automated facilities for the provision of information service was also perceived to be very important with the mean score of 8.2. Developing and managing reference resources was also perceived to be important. Public relationing and communication skill received the mean score of 7.87, indicating that it is a crucial element in the provision of information service. Three statements of skills were related to preparation of specialized tools and products for information service with the mean scores in the range of 7.6 and 7.2. Skills to develop policies and procedures had the mean score of 7. Three other skills, related to user education, editing and publishing, and use promotion received quite low scores of 6.4, 5.93 and 4.1, respectively. Naturally, these skills are considered less relevant in the setting of a special library.

Collection Development: Eight knowledge and two skill competencies, listed in Table 5, were validated for collection development. Knowledge of acquisition methods and tools, collection development policy, and acquisition vendors topped the list with mean scores of 8.5 and higher. Knowledge of the use of acquisition management data was also perceived to be very important with the mean score of 8.11. Both the competencies related to knowledge of users and user needs had the mean score of 8.25. Knowledge of publishing industry was at the bottom of the list, but with quite a high mean score of 8.

Table 5. Collection Development Competencies

KNOWLEDGE	
Statement	**Mean**
Acquisition methods and procedures	8.75
Acquisition tools and sources of bibliographic information	8.50
Developing collection development policies and their implementation	8.50
Vendor systems and services and assessment of their capabilities	8.50
Acquisition management information data and its applications	8.11
Developing and maintaining active liaison with users	8.25
Users, their characteristics and interests, and their information needs and behaviours	8.25
Publishing industry; international, national and sectoral	8.00

SKILLS	
Statement	**Mean**
Acquisition methods and tools and their applications	8.75
Use of acquisition management data for policy development and decision making	8.54

KNOWLEDGE		
Statement	**Mean**	**Frequency**
Serial management: policy development, functions, operations, methods, tools, services and products	8.80	5

SKILLS		
Statement	**Mean**	**Frequency**
Monitoring fund allocation and utilization	8.17	6
Reviewing bibliographic sources and user requests for selection decisions	8.17	6
Serial management operations (subscribing, claiming, binding and preservation, record keeping, services, etc.); application of policies, tools	8.00	5

Table 6. Serial Competencies

Only two skill competencies were validated for this function, but with high mean scores exceeding 8.5. These were related to acquisition methods and application of acquisition management data.

Serials: One knowledge and three skill competencies, validated for serial operation, are listed in Table 6. These need to be reviewed in conjunction with the collection development component which are complementary in nature. The knowledge competency, with the mean score of 8.80, covers serial management operations, services, and instruments. The skills are related to fund management, selection and subscription aspects, and operations, all receiving the mean scores between 8 and 8.17.

Conclusion

These results have elicited a core of foundation competencies needed for the preparation of entry-level professionals of special libraries of the future. These include: placement of the library in the organizational structure, definition of its role in relation to organizational context, establishing vitality of the information utility, management capabilities, and information technology applications in organisation and provision of information service. Subject knowledge and ability to analyse information needs of the clientele are additional expertise expected of these professionals.

The primary thrust for the future information professional is on the information service competencies. Literature searching and provision of specialized services are most emphasized. These also require a sound grounding in the information resources in the area in which the organisation has an operational focus, and use of resource sharing and networking capabilities.

It is somewhat revealing that basic cataloguing competencies are still given much importance in the Malaysian setting. However, in other technical services of acquisition and serial control the professionals are expected to have a sound knowledge base whereas the conduct of operations at the skill level may not be assigned to professionals. These results have indicated the futuristic aspirations of the employers and it is now the responsibility of the designers of education and training programmes to reorient their activities along these lines. These results have also provided objective criteria for evaluation of the existing education and training programmes.

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Whither the information profession? Challenges and opportunities. The cultivation of information professionals for the new millennium.

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Paper presented at the Aslib Electronics and Multimedia Groups Annual Conference, 14-16 May 1997.

Scene setting

The continuing explosion of information

Arguably the information professional today faces so many challenges, but at the same time there are equally so many opportunities to innovate, seek out new customers, improve existing services and systems and harness the continuing explosion of information to the organisation's and individual customer's advantage. The converging technologies are offering opportunities which no other generation of information workers has ever been able to even dream of previously. From your own workstation it is possible to link easily and cost effectively into services, systems and information which were previously either not accessible, or not even known.

The growing demand for authoritative and validated information

The (growing) link to this continuing explosion of information is a growing demand from the customers for authoritative and validated information which may be required to be delivered in any format – print, e-mail or on disk at an agreed time and price.

The customer base is ever widening:

- from governments, regional, national and international
- from the business sector
- from the industry and commercial sector
- from the education sector
- from the general public

We also find that the customers are overwhelmed with the vast array of information and now more than ever, because of pressures for performance and success in their own jobs, need to be able to contact reliable information services. Perhaps the statement 'People are thirsty for knowledge... but drowning in information' was never more apt than it is today.

The Opportunities

There are many opportunities which the converging technologies are presenting to the information industry such as being able to:

- e-mail customers with new items in their subject interest
- provide value-added services by carrying out an information search across a wide range of external services, download the results, analyse, and re-package to the customer's actual requirements
- establish an Intranet with relevant information for the staff.

Lack of information skills in the majority of organisations

Whilst there appears to be a wealth of IT equipment in many organisations, particularly since the advent of the personal computer, what appears to be lacking are information skills in staff who are expected to be able to control their own systems, and to search cost-effectively and knowledgeably for information in internal and external systems. It appears that equipment and systems are installed in many organisations, but that very little training is given as part of the installation.

The individuals lacking these skills need to be shown:

- how to use the equipment effectively and to understand what they are doing
- how to operate the systems available
- where information relevant to their job is located, either internally or externally to the organisation
- at what point to ask for further help
- how information is indexed and where the authoritative and validated information can be found.

Why there is a need to cultivate information professionals

There is a need for today's information professional to develop new skills to meet the increasing demand for information, but the problem is that many people do not continue to enhance their qualifications, nor to develop skills which were perhaps not needed or even thought about ten years or so ago.

The primary need for skills development is in the areas of business and finance. Without such skills it is impossible to operate an effective information service. It is essential that today's information manager, who may be controlling a budget of many thousands of pounds, must know accurately how much the services (internal and external) cost, total staffing costs, overheads, capital investment, and be able to estimate accurately the value of revenue generating services.

Because many organisations contract out some of their services, and also have service level agreements with customers and suppliers, the information manager needs to acquire good negotiating skills. Every agreement needs careful handling to ensure that the information service gets the best possible deal in all its activities.

Marketing and PR

A demanding area for any information professional, and in particular the information manager, is the need to acquire marketing and public relations skills. It is no use developing information services if these are not publicised and marketed. Before any service is developed, a business plan is necessary which will include research into the potential market, identification of target groups, the information needs of the customers, the staff skills needed to develop and sustain the services, the costing of the development and sustaining of services and products, and the vehicles to be used to market and publicise them.

Presentation

It is essential that all information staff develop good presentational skills, to be able to talk to groups of people or individuals with confidence in order to pass on their knowledge efficiently.

How easy is it for you to talk to customers about the services available from your information service/ library? Increasingly we need to present ourselves; from giving papers at conferences to demonstrating online databases, from talking to groups of users about their information needs, to showing an individual how to use information sources. The better we present the information the more the recipient will get out of it.

The use of technologies to create new services

The information professional must have an understanding of the technologies available to be able to seek out new services or systems on offer in the market place and be able to evaluate their possibilities for use within the information service. It is not essential to be a computer programmer but it is essential to be able to understand what the technologies and emerging multi-media technologies have on offer. It is necessary to be able to sell the potential within those services, to be able to repackage services aided by the technologies, and to meet the customers' present and future requirements.

At the same time the information professional must look continuously for new markets into which to be able to sell and deliver the information held. Maximising on the existing information should be a priority: if necessary repackaging the 'goods' to give them more appeal to the customers.

The need to reconsider the role and image of the information professional

The problem is the continuing universal image of the information worker 'The Librarian'. It does hinder the acceptance of the information service as core to the organisation because other professions do not accept the information worker on the same level. So we must develop a modern image, which includes professional skills coupled with business acumen. The information service must have a central role in all organisations. Ask yourself if your information service is central to your organisation. It is crucial that any strategic planning and operational planning must incorporate the information service, which must be business oriented, and constantly on the alert to understand how the organisation itself is developing and moving.

Understanding is required of other sections' and departments' deadlines, and how realistically and cost effectively to agree to meet those deadlines. Essential reading is the Reuters report.

Trainer

It is perhaps in the role of a trainer that the information worker will be able to succeed and exert most influence. The skills which information professionals already have must have new skills added to be able to train customers to search efficiently for their own information from systems and services available. The information professional armed with new presentational skills should be able to offer to all levels in the organisation the opportunity to enhance their own information skills and knowledge base.

Mover and Shaker

Perhaps an area to be explored is for the information professional to be able to influence the organisation and become one of the 'movers and shakers' of the organisation.

This means the ability to recognise opportunities, point them out to the organisation, at times being a risk taker, but most of all raising the awareness to all customers that without a regular flow of up-to-date knowledge the organisation cannot really succeed, and neither can the individual. There are people in all organisations who firmly believe they do not need any information, because they know it all. Perhaps this is a challenge which no worthy information professional can ignore. There is always some really up-to-date information available which that type of user will not have, so it can be relatively easy to overcome any previous convictions and prejudices.

Need for the continuous professional development of the information professional

No individual can afford to rest on the qualifications gained in previous years. There must be a continuous personal assessment where the individual will assess the skills currently held, and the skills needed to be able to tackle other jobs or tasks.

So it will be necessary to:

- continuously update skills learned from the start of your career noting that some skills may be redundant because of the technologies
- develop your own career map and find the right routes for yourself
- look for opportunities to gain wider experience
- don't be afraid to tackle a job – reach out
- train, re-train and train again

The Information Engineering Professional

Because there is this continuing pressure for the information professional to keep his/her skills and knowledge constantly updated, the European Commission's DGXIII has sponsored the EUROIEMASTERS project for which I have been principal contractor. The syllabus has been designed to offer the Information Engineering Professional (IEP) opportunities to extend and develop their knowledge and skills. Some of the Modules in the syllabus can be taken at a distance, and this will assist those who do not have access to the syllabus in a local geographic area. Other modules, which are heavily reliant on the computer and software facilities, will need to be taken at those institutions offering the qualification of European Master in Information Engineering.

The overall content of the European Masters in Information Engineering provides a balance for the development of skills of the generalist as well as the specialist. The syllabus will also offer opportunities for those currently employed to update their skills in a particular area, e.g. multi-media. This way one or more modules could be taken, no doubt with the agreement and support of the employer. This updating opportunity will meet the European Commission's objective of life-long learning.

The Syllabus contains fourteen modules, which will be offered by universities across Europe – either as a total syllabus or, depending on specialisms available, only a number of modules may be offered by some universities. The co-operation and collaboration of universities across Europe is envisaged in offering this Masters syllabus.

What the EUROIEMASTER offers

The Syllabus will be delivered over three Semesters. Each module in Semesters 1 and 2 will have forty hours content time: lectures, assignments, projects – either individual or in groups, readings, etc. Note that some of the Modules are half modules and therefore will have twenty hours content time. The student will take Modules 1 – 5 in Semester One; Modules 6, 7 and 8 in Semester Two, and a choice of two Modules from Modules 9, 10, 11 in the first half of Semester Two; and a choice f rom Modules 12, 13 and 14 in the second half of Semester Two.

The EUROIEMASTERS syllabus aims to produce the information engineer who will acquire skills and knowledge in the following areas:

- organisational and management
- human communication and information behaviour
- information resources and society
- information management and telecommunications systems
- multi-media systems
- advanced information retrieval
- user interface design
- multi-media programming
- hypertext and hypermedia
- distributed systems
- product development and marketing

Prerequisites

The proposed course is intended for participants from a mix of backgrounds, both technical and non-technical. It is intended that the course material will enable a blending of skills which will be reinforced by the diverse backgrounds and existing skills of students. Consequently the entry level requirements will be hospitable to a wide range of first degree backgrounds from computer science to business and communication studies.

The entry level for those with relevant primary degrees should be graduation in the top third of graduating classes. However, to encourage mature entrants other criteria, such as relevant experience and employer support, should be negotiated by the individual institutions offering the Masters.

The Golden opportunity

I urge you to update your skills, look for new ways of working, take some risks, ensure that your information service is central to your organisation and remember, 'The future belongs to the information industry and the knowledge workers'.

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Aslib PROCEEDINGS

ONLINE, CD-ROM AND WEB: IS IT THE SAME DIFFERENCE?
Helge Clausen

ESTIMATING THE RECALL PERFORMANCE OF WEB SEARCH ENGINES
Sarah J. Clarke and Peter Willett

PARTICIPATIVE MANAGEMENT IN A UNIVERSITY LIBRARY: THE CASE OF ABUBAKAR TAFAWA BALEWA UNIVERSITY LIBRARY, BAUCHI, NIGERIA
Johnson E. Akpena

SINTO AND CO-OPERATION
Carl Clayton

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Aslib Proceedings, vol.49, no.7, July/August 1997. pp.173-196

Editorial

Ready access to online databases was, once, going to eclipse the use of hard-copy publications. Then CD-ROMs were going to eclipse the use of online databases. Then Web access to sites via hot links was going to eclipse the more 'traditional' online database. Of course none of these eclipses actually happened. Each new development has simply settled in to a particular niche to which it is best suited. In the process of settling in it has caused us to think about what the niches are and how we should best enter them. It is just as well that new technologies (and new applications of existing technologies) are not affected by expert predictions. The technologies and applications are driven by very complex forces more powerful, and less susceptible to analysis, than simple-minded predictions.

Helge Clausen's paper on *Online, CD-ROM and Web: is it the same difference?* demonstrates how in one study the relative levels of use of the three technologies have been shown to readjust themselves to accommodate new patterns of use; and changing levels of user expectation. Not least among the users whose expectations are changed are the information professionals. At the risk of giving away the plot, part of the conclusion of the paper is that while anyone can get *something* out of using the Web, effective use by information professionals calls for at least a minimum set of searching skills: professionalism; and experience. Hooray! Information professionals still have a role to play!

A closer look at the supporting data however shows that there are areas where professional activities would be expected to make an impact, yet seem to have failed to do so. Examination of Table 4 in the paper shows that the use of organised information resources as a whole is generally rated by users and enquirers as being of some, or no importance. The table following (Table 5) seems to show that the importance of having access to business information databases is ranked very low by most Small and Medium-sized Enterprises (SMEs). The figures are from Denmark, but they feel remarkably like the equivalents statistics for the UK. It seems that the skills of searching for, acquiring, managing and deploying information resources for strategic business advantage are still widely unappreciated, or totally unrecognised.

The paper by Sarah Clarke and Peter Willett *(Estimating the recall performance of Web search engines)* addresses another complex area of information identification. As each new information technology has arrived, it has been accompanied by a general and widespread belief that it can erase the problems of past technologies, and deliver information-searching performance that makes machines work like people (which is an awful thought – machines and people should surely work together so that each capitalises on the strengths of the other). This delivery never happens because the real problems of information searching are conceptual and intellectual, not technical. Chief among these problems is that of being able to carry a 'picture' of the structure of the system being searched. (System here means the combination of content, organisation, indexing, coverage etc.)

The Cranfield experiments of the 1960s used constrained data sets so that it was possible to know precisely, for any particular query, how many documents ought to be retrieved. This knowledge could then be used to compute the ratios of relevance, recall and precision. The Web environment is unconstrained: it cannot be known exactly how many documents should be retrieved, let alone how many in total are available. It has seemed for some time that the formal measures should be replaced by a single one: 'enough'. This is a logical response to hit-rates in the thousands resulting from relatively simple search strings.

The Clarke and Willett paper introduces a way of calculating the classical ratios for unconstrained data sets in such a way that meaningful ratios can be derived, even though complete searches may never be possible.

The paper following, on participative management in a university library, draws some necessary conclusions on the importance of staff being involved (and feeling involved) in the decision-making that affects their working environment. The fact that it has a familiar ring does not diminish the need to spell out the message. This issue concludes with the text of an address by Carl Clayton, Director of SINTO, to the Aslib Northern Group annual general meeting. This paper raises interesting questions of whether co-operation is most effectively applied at the level of sharing access to collections, or of collaborative action to promote the work of the library and information services profession.

Peter Gillman
Editor

Online, CD-ROM and Web: is it the same difference?

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Abstract:
Some obstacles to the use of electronic information are discussed. The major differences between information from online, CD-ROM and Web sources are outlined. Data from Århus Public Library's business information services (1992-96) are analyzed with special reference to information media. A decrease in the number of enquiries after 1994 is explained by (1) the growing number of online database end-users, (2) the increasing supply of business information on CD-ROMs, and (3) the spreading of the Internet. Recent information from the DGXIII Report about the markets for electronic information services are included. What is needed in general among future users of electronic information is a more professional attitude and new skills. A concept of "Web Information Literacy" is defined and two implications are discussed: (1) knowledge about the Internet and its resources, and (2)innovativeness as a major component in Internet user skills.

1. Introduction

The present supply of information resources is made up of a range of products that may exist in several different forms. In principle, for example, a bibliographic database may be available in paper form, in microform, on a CD-ROM, and as an online accessible database (either traditional online, or Internet).

Twenty years ago, when the supply of online databases began to increase rapidly, many people thought that the days of printed material were numbered. Ten years ago, similar prophecies were pronounced on both printed material and online sources when CD-ROM's began to flourish. In 1993, when the Internet, and especially the hypertext part of it, the World Wide Web, unavoidably appeared on the horizon of information professionals, great expectations arose foretelling that the future belonged to that new, marvellous, medium alone.

Today, a plethora of all sorts of information resources is available. It is only up to the user's financial and technical abilities what type of information resource will be purchased or accessed.

The great question, however, is how far it is possible to predict future or near-future use of the main types of information sources (according to media) that exist today:

- printed material (including microforms)
- online accessible databases
- CD-ROM databases
- World Wide Web sources

In advance most information professionals would expect the supply of printed material to decrease in favour of electronic media.

2. Online or not online – that's the problem

In October 1996 the European Commission (DGXIII/E) published a Study on the markets for electronic information services in Europe[1]. The Study is a mine of information concerning the activities of information producers, information brokers, supply and demand of information, etc., throwing a searching light on the European information infrastructure. The latest statistical information in the Study dates from 1994, which makes it less usable at present. The general findings, however, are still of interest concerning the near future of electronic information. No doubt that the availability and use of Electronic Information Systems (EIS) has been increasing rapidly during the last decade. But there are still some obstacles to conquer. According to the opinion of the present author there will always be some problems to tackle as long as there is development. New thinking and solutions are often born as a result of existing problems. The Study identifies some main reasons for *not* using electronic information services among information professionals[1 (pp.145-146)]:

1) Lack of awareness. First of all, there is a lack of knowledge about the use and the value of electronic information services. The Study maintains that many users still focus on existing, traditional and familiar sources, e.g. printed media and personal contacts. In the present author's opinion there is nothing wrong with personal networks in general. Information from such contacts should, however, be used as a supplement to the more objective information retrieved from recognized sources. The European users obviously feel that there is a need for highly condensed, easy-to-grasp, practical information in electronic form. This type of information, however, is not easy to obtain, since it is not adequately provided by existing information services.

2) Unsatisfactory relationships between supply and demand. The European users found that there were deficiences in the information offered at three different levels:

a. The information searched for is *not available* (there is some superstition around saying that all relevant information is available in electronic form).

b. The information offered is *not user-oriented* (not every user is capable of understanding some hard core bibliograpic references in MARC format).

c. The information offered is *not complete* (full-text/ original sources are expected by many contemporary users. In general, users experience these deficits as market barriers caused by the supply side).

3) Prices of services are too high. European users from Small and Medium-sized Enterprizes (SME's) and some entrepreneurs often think that the prices for electronic information services are incomprehensible. Since online services were introduced to the public more than twenty years ago this has always been the obstacle of the novice user who cannot see through the different layers of intermediating suppliers (database owner, producer, host, network, intermediary, etc.).

4) Lack of network capacities and lack of user-friendliness. In some less favoured regions network deficiences caused many problems. Today, these problems seem to have been solved in most regions. Further, many European users thought that usage could be higher if the services were more user-friendly. The old problem of user-friendliness, however, is not an easy one. Many definitions have been proposed. In general, a system may be characterized as user-friendly if it is easy to learn, and effective and satisfactory to use.

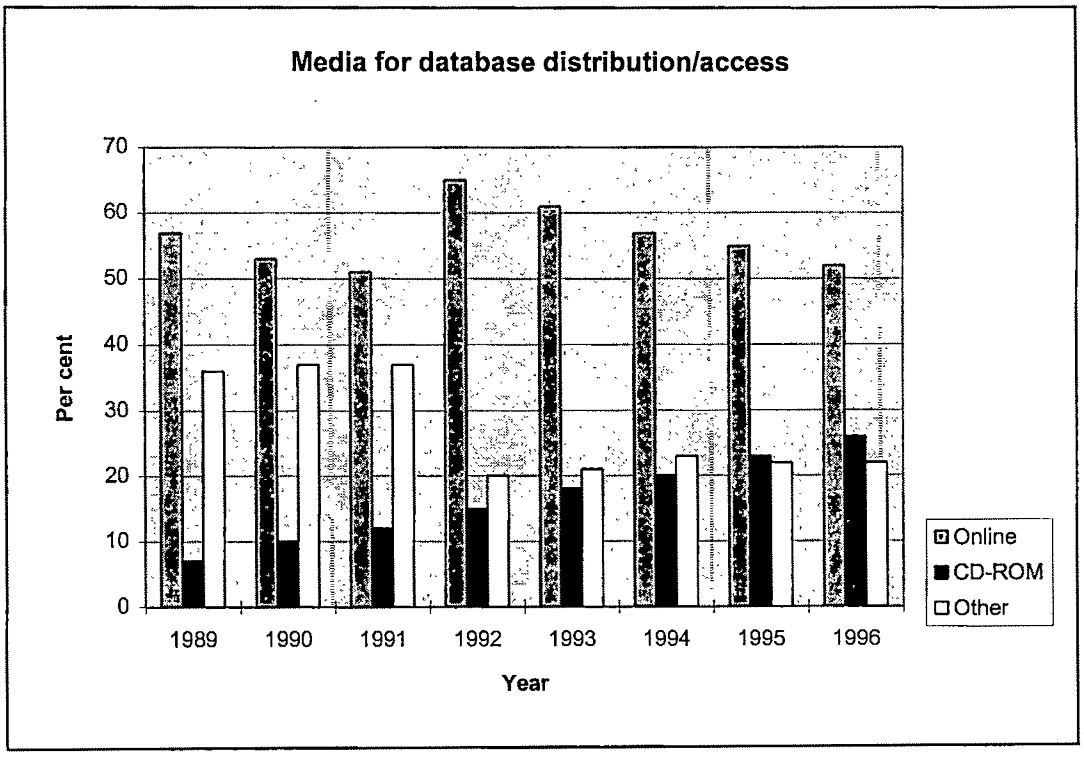
The general developments in the information market, together with new solutions of the above technical aspects, may contribute to a gradual removal of these obstacles. At this stage, however, it would be useful to have some current figures for the EIS market development. In order to get an overview let us have a look at some trends formulated by some of those who are expected to keep a watchful eye on what is going on at present and what is most likely to happen in one, two, or five years' time.

3. Figures and forecasts

The most complete and reliable overview of existing databases (online, CD-ROM, diskette, magnetic tape, handheld, or batch access) can be found in the *Gale Directory of Databases*[2] The semiannual Directory includes an introduction (The state of databases today) by Martha Williams who analyses and comments on the statistical data that has been extracted from the records of the Directory. In the 1997 edition it is possible to look back on twenty-two years of development (1975-1996). The number of databases has grown by a factor of 33 (from 301 to 10,033), while the number of records in these databases has increased by a factor 207 (from 52 million to almost 11 thousand millions), the average database having 126,000 records. About 70 per cent of the databases are *word-oriented* (in Martha Williams' classification by form of data representation). Among the word-oriented databases the latest twenty years have seen a decrease in the number of bibliographic databases (from 57 to 24 per cent) while the relative share of full-text databases has increased from 28 to 51 per cent. Geographically, 69 per cent of all databases originate from North America, 22 per cent from Western Europe and the remaining nine per cent cover the rest of the world. During the latest six years the figures for North America and Western Europe have decreased slightly[2] (p.xxiv).

The most interesting figures, however, relate to the developments of different media for database distribution and access:

Figure 1: Media for database distribution/access, according to Williams.



The relative increase in the relative number of online databases from 1991 to 92 (fourteen percentage points) matches quite well with the decrease of the incidence of magnetic tape (five points) and batch systems (eleven points). After this particular development the figure shows that for the latest five years there has been

- a decrease in the relative number of online databases
- a similar increase in the relative number of CD-ROM databases
- a nearly stable relative number of databases on 'other' media (diskette, magnetic tape, batch, or handheld).

On European ground some findings from the EU DGXIII Information Market Observatory (IMO) ought to be included. In its Report from 1996[3] about the markets for Electronic Information Services in the EU IMO maintains that the markets for EIS can be characterized by explosive growth, dramatic structural change and an intensive impact upon the competitiveness of companies and national economies as well as upon lifestyles and culture. There is an estimated growth rate of the European information industries at nearly 20 per cent per annum. At present, the following rule of thumb applies to the European EIS market structure: 80 per cent online and 20 per cent offline. The online sector is made up of 40 per cent real-time financial information, 30 per cent retrospective online services, seven per cent videotex, and four per cent audiotex, while the the offline-sector includes six per cent CD-ROM, three per cent 'other offline services', and nine per cent 'other products'[3(p.7)].

Of course, these figures cannot be compared directly with Martha Williams' figures (Figure 1) because the IMO figures reflect the use of the different types of information media while the Williams figures are quantitative expressions for the supply of information media.

In the case of the development of databases on CD-ROM figures have been growing constantly over the years in step with falling prices. CD-ROMs have become increasingly popular, especially with private PC-users. In its working paper from February 1995[4] about electronic information services in the home IMO has the following forecast about the number of installed CD-ROM drives in homes:

Table 1. The number of installed CD-ROM drives in homes (millions):

	1994	1995	1996	1997	1998
Western Europe	2.74	9.04	17.69	26.85	35.96
USA	13.43	21.96	29.89	36.43	42.18

According to Bronfman[5] about two thirds of the CD-ROM drives are in private homes. If this rule of thumb also applies for Western Europe a total number of CD-ROM drives of about 110 million must be expected in 1998 (increased by a factor of five since 1994).

4. Some findings from Denmark

In the present chapter the use of business information sources in Denmark will be discussed as an example of conditions in a small country with an advanced library and information sector. The area of business information has been selected because of the availability of reliable statistics and a heavy use of EIS.

Denmark has a population of 5.1 million. Nevertheless, the above DGXIII Study[1] identifies only six information brokers in Denmark: "In Denmark it seems not to be possible for more than a rare few to make a living as an independent information broker, and to succeed in running an information broker enterprise is an absolute exception"[1(p.105)]. This fact is connected with an old tradition within Denmark to have a strong, publicly supported library system whose main objective is to place information at the public's disposal free of charge. Danish academic and special libraries have a long tradition of serving business and industry. In most cases, however, only large companies profit directly from these services. Large companies usually have special information service departments, staffed with information professionals. These information professionals usually know how to make use of the information resources of the academic and special libraries. Normally, SME's do not have a library or documentation centre of their own. Moreover, they only use external information services occasionally. This is caused by the difficulties they have in realizing the value of the information offered. Many of the SME managers are not even aware of the existence of extensive amounts of relevant business information! However, should the SME's need information, they must turn to the services of the public libraries, trade organizations, or the commercial services of information brokers or consultants. In the past, only a few of the major Danish public libraries focused on the information needs of local SME's. Since 1989, however, some of the major public libraries have given a higher priority to business information. In the present article the situation in Århus County will be used as an example of the use of different types of media in business information.

Århus is Denmark's second largest city with about 260,000 inhabitants, a university and several other institutions of higher education. In the County of Århus with its 600,000 inhabitants there are about 12,000 firms of all sizes and types. At the Århus Central Public Library, Denmark's most successful public library based business information service is operating. In 1989 the public libraries' business information services were organized into a network between the public libraries in twelve municipalities out of 26 in the County. All twelve business information services are financed by the municipalities concerned. The figures given in Table 2 reflect the business information activities at the Central Library[6,7]

Table 2. Number of enquiries in 1992-96 distributed on type of users (Business Information Service, Århus Public Library, the Central Library).

Type of User	1992	1993	1994	1995	1996
Manufacturing	294	431	469	531	411
Service	665	670	821	712	562
Entrepreneurs	161	180	149	104	134
Public institutions	145	177	164	131	134
Other libraries		0	20	26	6
Total	1,265	1,458	1,623	1,504	1,247

After a period of growth from 1992-94 activities have decreased again from 1995. Public institutions and entrepreneurs reached their height in 1993, users from the service group in '94, and manufacturers in '95. There are no obvious socio-economic changes in Denmark that could be used as elements in an explanation. These differences might be explained by means of increasing in-house use of IT and access to business information resources. Because of Danish Government IT-policy many public institutions got PC's earlier than many businesses. Entrepreneurs who need information are often high-tech firms that soon took over electronic information retrieval themselves. The decrease of business information acitivities at the Århus Public Library is not an isolated phenomenon. Figures from the county libraries and the Central Office (assisting the county libraries) show the same tendency (Table 3).

Table 3. Number of business information questions to the public libraries in Århus County, 1993-96.

	1993	1994	1995	1996
Århus	2,308	2,646	2,371	2,148
Central Office	1,227	1,041	850	832
County libraries	1,308	1,420	1,199	1,082
Total	4,843	5,107	4,420	4,062

Most of the above questions are difficult or impossible to solve without the use of online or CD-ROM databases. Today, an increasing number of SME's have some sort of computer equipment and network connection. During the last couple of years their competence has increased due to:

- the general trend of an increasing use of computers in all areas of society
- the large supply of business information sources, especially on CD-ROM
- the triumphal progress of the Internet/WWW.

Even if the SME's have an increasing experience in information retrieval some areas remain where they are, unable to fulfil their information needs without the assistance of some external information professional (patents, statistics, law, and standards, among other things).

In the autumn of 1996 an independent consultant made a survey of the users of the Århus Public Libraries business information services[8]. A total of 152 interviews were carried out in order to disclose the users' satisfaction with the services and their attitude to different types of information resources. The interviewees mostly came from SME's (75 per cent of them came from firms with 1-50 employees, seven per cent: 51-100 employees, and 18 per cent: 100+ employees).

In Table 4[8, p.26] the users have indicated their ratings of different types of information resources other than the Business Information Services:

Table 4. Ratings of the importance of other information sources, users of Business Information Services, Århus.

Type of information resource	Major importance (%)	Some importance (%)	No importance (%)	Total (%)
Own reference works	46	34	20	100
Own specialist literature and periodicals	49	38	13	100
Own access to databases	22	9	69	100
Own access to the Internet	14	15	71	100
Other libraries	18	36	46	100
External consultants	30	37	33	100

Even though the more traditional resources have been rated as most important about 30% think that access to databases or the Internet is of major or at least some importance to their enterprise. The importance ascribed to databases is further analyzed in Table 5[8, p.29]:

Table 5. Ratings of the importance of having access to databases, users of Business Information Services, Århus.

No. of employees	Major importance (%)	Some importance (%)	No importance (%)	Total (%)
1-10	18	3	79	100
11-50	24	18	58	100
50+	58	10	32	100

There seems to be a clear connection between the number of employees (size of firm) and the importance ascribed to databases. Two thirds of the interviewees who come from firms with 50+ employees think that database access is important for their business. Presumably, many of those having positive attitudes to databases are active users themselves. A similar analysis has been made regarding Internet access. The findings are shown on Table 6[8, p.29]:

Table 6. Ratings of the importance of having access to the Internet, users of Business Information Services, Århus.

No. of employees	Major importance (%)	Some importance (%)	No importance (%)	Total (%)
1-10	11	12	77	100
11-50	16	11	73	100
50+	20	24	56	100

Here, we also have a positive connection between the number of employees (size of firm) and the importance attributed to Internet access. Forty-four per cent of the interviewees who come from firms with 50+ employees ascribe at least some importance to having access to the Internet. The trend is, however, less clear as concerning access to databases.

5. A pilot study

In May 1997 the present author carried out a small pilot study in order to explore present and future use of the existing types of information sources, according to media. Sixty randomly selected Danish information professionals with e-mail addresses were invited by e-mail to give their estimates of their overall use of different types of reference tools: printed, internal online (in-house databases), CD-ROMs, external online (external database hosts), and the Internet/WWW. Estimates were given for the actual use and for the future use (in two years). Forty-two answers were received and the findings are made up in Figure 2:

One should be cautious not to overinterpret these findings but apparently the respondents expect a decline in the use of printed reference tools and external online services in favour of resources available on the World Wide Web. Some of the services that at present are accessed via database hosts may also (or, may in the future) be accessed on the WWW. This may explain some of the changes that are foreseen. The decline in the future use of printed material is, however, substantial. In many cases a library, for example, still subscribes to a printed bibliography, even though the library has access to it in electronic form. This way of wearing both belt and braces is characteristic for many libraries in a transitional period. According to the respondents, the use of internal databases and CD-ROM remain on the same level.

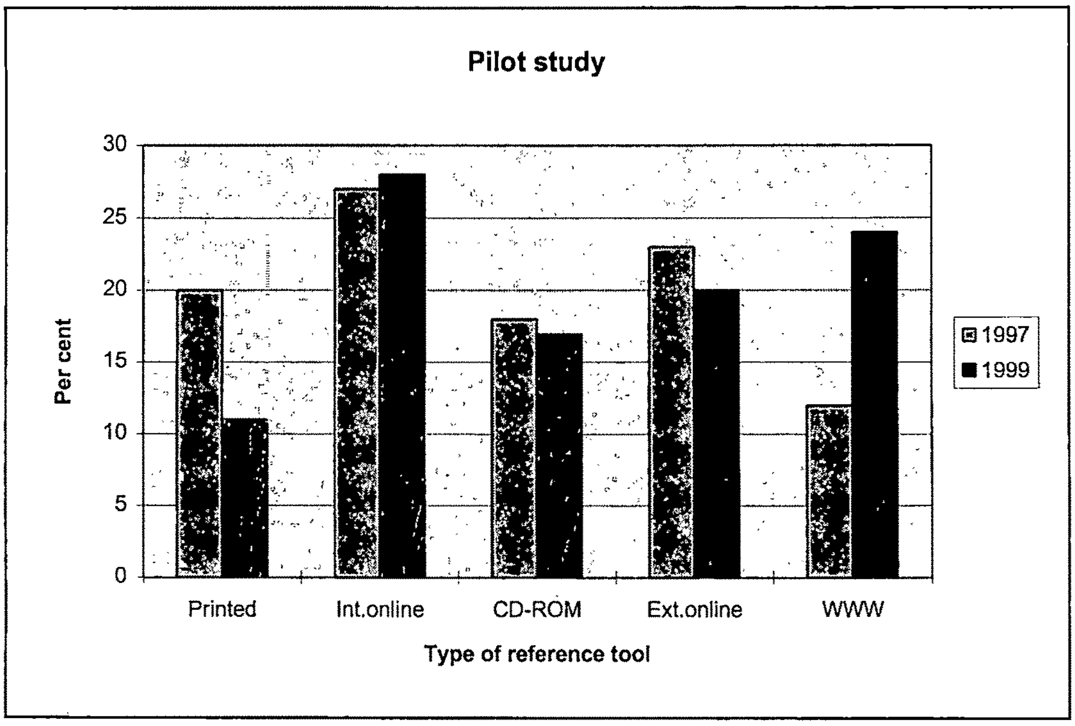
6. Discussion

6.1. Online

As mentioned above the relative part of online databases in the total number of EIS has been decreasing for a number of years. Recent information suggests that major online service providers are failing to attract current Internet users: a total of 39 per cent of respondents did not use any online services at all[9, p.14]. This trend collides with the fact that the online sector has for some time begun to migrate successfully from the academic, business and professional markets into the home.

No doubt that the commercial online service providers are facing a tough time. An example of what they could do in order to improve competitiveness is to develop more efficient search tools which could

Figure 2. Findings from pilot study of Danish information professionals' estimates of their actual (1997) and future (1999) use of different types of bibliographic reference tools.



attract users who are dissatisfied with rigid CD-ROM searching or primitive and confusing Web searching.

6.2. CD-ROM

According to Bronfman[5] packaged CD media is expected to increase market penetration in the late 1990s. This development takes place in the wake of the success of CD audio. A strong multimedia growth over the network is expected to take place shortly after the year 2000[5, p.42] leaving CD-ROM as a medium for text archives (dictionaries, encyclopedias, newspapers, periodicals, etc.), and even as a back-up of electronic documents on the WWW. As Jasperse maintains:

"... I envisage CD-ROM continuing to perform extraordinarily well as the effective, portable medium of sufficient information density that can be distributed (even with the required software to access it) at low cost, that will continue to be widely accessible on a very wide variety of computer hardware and which has unchangeable content." ... "this is why I see the value of CD-ROMs continuing as – permanent landmarks for fleeting superhighway traffic. Without this kind of permanence there is a serious possibility that a whole generation of Web manuscripts disappears because URLs are no longer valid or have changed..." [10, p.31]

6.3. The Internet/WWW

There is no doubt that the Internet will increasingly become the most important tool for searching business information, and most other kinds of information, too. Martha Williams has a long list of advantages of or functions that the Internet can provide for information professionals[11, p.6]. Among the many interesting points of this list the following statements may be used for a characterization of the Internet compared with traditional online databases and databases on CD-ROM. According to Williams the Internet provides

- a much larger potential market of users
- inexpensive and speedy communication with many databases
- low cost telecommunications to vendor sites
- help desk information via e-mail or BBS's
- international access
- improved document delivery options
- primary publishing and full text search facilities.

For financial and technical reasons (searching, user-friendliness, etc.) alone the Internet must be proclaimed winner in the long run. In the following chapter some implications will be discussed.

7. Web Information Literacy

The World Wide Web is easy to learn and to use – but only up to a point. Professional use implies what could be called *"Web Information Literacy"*. This new concept is similar to the last component in McClure's model of information literacy[12]: traditional literacy – computer literacy – media literacy – network literacy. A recent survey[13] has pointed out two main components: *knowledge* (about information and the Internet) and *innovativeness.* It was found that

- librarians who are more *knowledgeable* about the Internet will have more positive attitudes toward the Internet and will use it more than librarians who are less knowledgeable.
- librarians who are *innovative* will have more positive attitudes towards the Internet and will use it more than librarians who are not innovative.

While innovativeness is merely a sort of creative intelligence in the individual person, knowledge may be increased and modified to a great extent by means of training.

The realization of innovativeness as a major component in Internet user skills is connected with some interesting findings from a comparative survey where innovation theory was applied to library services[14]. Among other things innovative people maintain larger external networks[14, p.82]. The question is whether Internet users from the SME's are willing to qualify for a more professional attitude regarding information retrieval. In the present author's opinion they ought to. It would only be a natural and necessary development building on the existing telecommunications and computer resources. The Internet is already being used as a strategic business tool[15], boosting business productivity and enhancing competitiveness.

8. Conclusion

Users of electronic information services must acquire some professional skills in order to retrieve high quality information. During recent years end-user searching has become visible, e.g. in the statistics of the business information services of the largest Danish public library. The fast growing number of Internet/WWW-users marks a turning point in the business of business information and most other information services. Apparently, anyone can use the search facilities of the WWW to the same extent. A professional use, however, still depends on a minimum level of professional skills and experience.

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Estimating the recall performance of Web search engines

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Abstract

This paper reports a comparison of the retrieval effectiveness of the Alta Vista, Excite and Lycos Web search engines. A method is described for comparing the recall of the three sets of searches, despite the fact that they are carried out on non-identical sets of Web pages. It is thus possible, unlike previous comparative studies of Web search engines, to consider both recall and precision when evaluating the effectiveness of search engines.

Introduction

The explosive growth of the Internet over the last few years has led to the development of *search engines*[1-4], which provide interactive access to the many millions of pages of text that are now available via the Web. The search engines considered in this report comprise two main components, these being a resource detection program and a text retrieval program; other types of search engine, such as Yahoo!, make use of predefined subject directories to facilitate searching but are not considered further here. The detection program, variously referred to as a *robot*, a *crawler* or a *spider*, is despatched to every site that it can identify on the Web. The program downloads the pages at the site, and extracts indexing information from them to enable their subsequent retrieval. The indexing data resulting from this procedure is stored in the search engine's database together with the Uniform Resource Locator (URL), which acts as the primary key for displaying the page when it is retrieved by a search. The retrieval program accesses this database, which is structured as an inverted file analogous to those employed in conventional online systems, in response to queries submitted from users' browsers and then returns matching pages for user inspection. A noticeable difference from the existing online systems is that while the former have traditionally offered Boolean searching facilities, with a best-match option becoming available in some systems over the last few years, the search engines have overwhelmingly adopted best-match searching as the default mode of operation, with Boolean searching being offered as an alternative, and generally advanced, retrieval option.

The sheer number of search engines that are now available has made them a popular and an important subject for research[5,6]. However, as we demonstrate in the next section, while there have been many studies which evaluate or review the performance of Web search engines in qualitative terms, only a few have tried to analyse the performance of these services using systematic measures of effectiveness such as are common in information retrieval research[7]. In particular, the studies that have appeared thus far have considered only precision and have made little or no attempt to assess the recall performance of the various search engines that have been tested. The aim of the study reported here was to develop and execute a methodology which evaluated both the precision and the recall performance of three of the most widely used search engines; full details of the experiments are presented by Clarke[8].

Previous Evaluations Of Search Engines

Much of the literature associated with Web search engines is purely descriptive in nature, discussing features such as the types of search that can be carried out, the engine's interface, and the indexing policy that is used by the spider. Even where some form of critical evaluation has been carried out, the discussion is often anecdotal or qualitative in character, reporting an individual's experiences with some small number of queries, and eschewing the quantitative methodologies that have been developed to evaluate the effectiveness of information retrieval systems[9-12]. Good examples of qualitative evaluations are provided by Lebedev[13], Leonard[14], Lindop *et al.*[15], Winship[16] and Zorn *et al.*[17], inter alia. In what follows we focus upon those reports that provide some quantitative data relating to search performance.

Leighton[18] searched eight queries of varying difficulty on InfoSeek, Lycos, WebCrawler and WWWWorm. The best results in terms of precision and response time were obtained with Lycos and InfoSeek. Randall[19] tested no less than 14 different search engines with a "fistful" of queries, ranging from stock market quotes to sound files from independent music releases. Search engines were assessed for usability (interface, instructions and customisability) and effectiveness (number and accuracy of the hits). InfoSeek was rated most highly followed by Lycos, WebCrawler and WWWWorm. Scoville[4] car-

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ried out a study of search engines by counting the number of hits for a particular query and then determining what proportion of the top ten hits were relevant: Excite, InfoSeek and Lycos were rated most highly.

One of the more comprehensive descriptions is that by Chu and Rosenthal[5], who evaluated Alta Vista, Excite and Lycos. They used 10 sample queries, of differing levels of complexity, which were selected to test the following features of each search engine: response time, precision (evaluated for the first 10 documents downloaded for each query), output options, system documentation and the interface. Chu and Rosenthal concluded that Alta Vista should be the first choice for users who require high precision whilst factors such as documentation and user interface can be based on personal preference. A similar study was carried out by Ding and Marchionini[20] who searched five queries using InfoSeek, Lycos and Open Text. Performance was evaluated using precision and salience, which was defined to be the sum of the relevance ratings for the hits of each service out of the sum of the ratings for all of the services. Lycos and Open Text were considered to be superior to InfoSeek.

Venditto[21] tested Alta Vista, InfoSeek, Lycos, Open Text, WebCrawler and WWW Worm with dozens of search terms over a two-week period. The first 25 results from a query were assessed for relevancy. The effectiveness of the search engines was tested by identifying known sites on a particular subject, then devising a natural language query and seeing if the search engines retrieved the known sites. Venditto found that all of the search engines performed well when presented with simple queries but found that differences emerged once more complicated queries were used. InfoSeek Guide was found to provide the most relevant hits, whilst Alta Vista was found to be the most comprehensive.

An extended study by Tomaiuolo and Packer[22] involved 200 topics reflecting undergraduate curricula. These queries were searched on Magellan, Point, Lycos, InfoSeek and Alta Vista, with the first ten hits for each query being assessed for relevance: the best engine was found to be Alta Vista. Another study by these authors[23] identified "benchmark sites" for a series of queries and then gave the queries to a number of volunteers of mixed Web experience. Volunteers were asked to search for the topics on Alta Vista and Open Text and given a score on the basis of how many "benchmark sites" they found. Such an approach does provide some information as to the recall performance of the two search engines, but the principal focus of the study was the users and their ability to use the search engines, rather than the effectiveness of the searches that were carried out. The need for such user-centred studies has been argued by Dong and Su[1]. Finally, Courtois et al.[24] tested performance by developing three sample questions and identifying the information resources they expected that search engines should be able to identify, based on the authors' experience of the Web rather than on a quantitative assessment of recall. Their comparison of CUI W3 Catalog, Harvest, Lycos, Open Text, WebCrawler, WWW Worm and Yahoo showed that only Lycos and Open Text Index identified all of the expected list of resources. A follow-up study by Courtois[25] included information on newer engines such as Alta Vista and Excite.

Experimental Methodology

Introduction

It will be clear from the review in the previous section that quantitative studies of Web search engines are quite rare, and that those making any attempt to assess recall, as opposed to precision alone, are still more infrequent. Indeed, it has been argued that recall cannot be evaluated because of the difficulty in determining the total number of relevant pages on the Web for a particular query[18] and because of the dynamic nature of the Web[5]. The approach to performance evaluation presented here was developed to redress these limitations. Specifically, we sought to obtain quantitative measures of both precision and recall when averaged over as many queries as could be searched within the time available for the dissertation component of a 1-year MSc Information Studies course. The experimental methodology we have used is based directly upon the document *test collection* approach that has provided the principal basis for IR research ever since the early Cranfield experiments[26]: the continuing strength of this methodology is demonstrated by its use in the ongoing series of TREC experiments[27,28].

Use of a test-collection approach

A document test collection consists of three components:

- A set of documents (more precisely, Web pages in the present context, but we shall use the two terms synonymously in the following).
- A set of queries, each of which is matched against the documents to retrieve a subset of them, this subset being either some number of the top-ranked documents (in a best-match system) or those that satisfy the logical constraints of the query (in a Boolean system).
- Judgements of the relevance of each of the documents to each of the queries, this allowing the calculation of retrieval effectiveness calculated in terms of the two traditional parameters, precision and recall.

Precision is the fraction of a search output that is relevant to a particular query, and its calculation hence requires knowledge only of the relevants and non-relevants in the retrieved set of documents. Recall, however, is the fraction of the relevant documents for a particular query that have been retrieved, and its calculation hence requires knowledge not just of the relevants retrieved but also of those *not* retrieved, i.e., of the total number of relevants in the database that is being searched.

It is easy to calculate both recall and precision when exhaustive relevance judgements are available. This was the case with the very small sets of documents that comprised the early test collections, but the provision of such judgements rapidly becomes impracticable as the size of the document set increases; for example, the TREC-4 experiments involved over a million documents totalling ca. 3.2 gigabytes of text [28]. In such cases, estimates of recall are obtained by inspecting the individual outputs of many different searches for the same query, and then *pooling* the sets of relevants retrieved by the individual searches. While this procedure may not identify all of the relevants for a specific query, it does provide a baseline against which the performance of individual searches can be determined: the recall values obtained are hence *relative,* rather than *absolute,* in nature.

We have used this approach here, carrying out searches with three different engines (Alta Vista, Excite and Lycos, as discussed further below) and then pooling the individual sets of relevant documents to obtain a set that could be used for the calculation of recall. However, a traditional test-collection experiment evaluates several different retrieval strategies by applying them to a common set of documents, and such a common database does not exist in the context of the Web. The reason for this is that the spider programs associated with different search engines adopt different criteria both for exploring the Web and for selecting the pages that should be indexed. There may well be a substantial degree of overlap between the pages indexed by two engines but the resulting databases that are searched will not be the same unless identical spider and indexing programs have been used. There is no reason to believe that this is the case, as even a cursory glance at the promotional material at the engines' home pages will demonstrate, and we must accordingly take this differential coverage into account when evaluating the recall of the searching component of a search engine.

Formally, assume that a query is searched using two engines, A and B, and that these searches retrieve a and b relevant documents, respectively. Assume further that there is no overlap in these two sets of documents so that the total pool contains $a+b$ relevants. We cannot immediately conclude that the recall of A and B are $a/(a+b)$ and $b/(a+b)$, respectively since it may be that some of the b relevant documents retrieved by B were not available to A, and vice versa. Accordingly, we can obtain a figure for the recall performance of A only after checking how many, if any, of these b relevants could, in fact, have been retrieved by A (i.e., how many had been processed by A's spider): if there are c such relevants ($c \leq b$) then the true recall for A is $a/(a+c)$. We discuss the implementation of this approach to the calculation of recall below.

Evaluation of retrieval effectiveness

Three search engines (Alta Vista, Excite and Lycos) were studied. Each engine was used to search a total of 30 queries compiled from research and essay topics of students at the Department of Information Studies, University of Sheffield and from subject areas of personal interest to one of us (SJC), who was also responsible for carrying out all of the relevance assessments on the sets of pages retrieved. The queries are listed in Appendix 1.

Each search engine was requested to retrieve the top-ranked ten Web pages for a query, and, following Chu and Rosenthal[5], the relevance of each of these retrieved page was judged on a three-point scale: a score of 1 was given to relevant articles, 0.5 to partially relevant articles and 0 to non-relevant pages. Relevance was determined by assessing the subject matter of each page returned by a search.

We have drawn upon the experience of previous workers[5,18,20] in adopting the following relevance criteria:

- If the page closely matched the subject matter of the query then it was given a score of 1.
- If a page consisted of a whole series of links, rather than the information required, then it was given a score of 0.5 if inspection of one or two of the links proved them to be useful.
- Duplicate sites (same URL, same contents) were given a score of 0 (these were found to be particularly common with Lycos)
- Mirror sites (different URLs, same contents) were not considered as duplicates and were scored as if they were unique.
- If the system reported a "file not found" or similar message for a particular URL, this suggested that the index had not been updated, and the site was given a 0 score.
- If a message appeared which said "There was no response. The server could be down or is not responding" for a particular URL then the page was checked later. If this message repeatedly occurred then the page was given a score of 0, since the summary information was frequently not detailed enough to make a meaningful assessment of the pages.
- Foreign language pages were often difficult to assess for relevance and were hence replaced by the addition of the next-ranked English page.

Use of these criteria enabled precision to be calculated for each of the queries on each of the engines. The relative recall for each query was calculated by means of the following two-stage strategy.

- The pool of relevant documents was obtained by merging the outputs of the three engines.
- Occurrences of overlaps between the search engines were noted, and a second search conducted for those relevant pages which had not been retrieved by all three engines.

A query for the second search was obtained by taking samples of text from a relevant page (i.e., one that been given an assessment of either 0.5 or 1) that had been retrieved by one (or two) of the engines, and then searching for this text sample in the other two (or one). If the page *was* then found in the top-ranked ten pages (typically as the very first page if a sufficiently large sample of text had been used to create the query) then this meant that it was available for retrieval but that ithad been missed in the original search; if the page was *not* found then it was concluded that it was not available for retrieval by that particular search engine. It was thus possible to calculate the number of relevant pages retrieved for a particular query, as a proportion of the number of relevant pages available to the search engine.

As an example, consider the first query that was searched (see Appendix 1). The Alta Vista search identified seven pages in the top-10 that were judged to be highly or partially relevant to the query. There were a further ten pages that were judged as relevant from the Excite and Lycos searches and that were subsequently shown to be present in the Alta Vista database. Accordingly, the recall for Alta Vista for that search was 7/17, i.e., 0.41.

Results and discussion

Three popular search engines were selected for testing: Alta Vista, Excite and Lycos, details of which are available from their home pages (http://altavista.digital.com/, http://www.excite.com/and http://www.lycos.com/, respectively). It was decided to use the lowest common denominator when selecting the search engine syntax and modes of operation for the search engines. Thus Alta Vista was used in Simple mode, Excite in its simplest format (called Concept mode), and Lycos in default mode with "match any term" and "loose match" being automatically selected.

The 30 queries listed in Appendix 1 were searched using the three engines in the period 21st June to 13th July 1997. Each individual query was searched on each engine in turn, the relevance assessments carried out as soon as the hit lists had been retrieved, and the second round of searches then conducted immediately after the first. In this way, each individual search (the three initial searches, the relevance judgements and the subsequent feedback searches) was completed within a single day so as to minimise changes in database content as a result of system updates.

Three performance parameters were calculated for each search engine for each query: the recall and precision as discussed previously, and the *coverage*. This was defined to be the total number of relevant pages that an engine could have found (after both searches) divided by the total number of relevant pages found by all three engines. To illustrate this, consider a search in which the Excite database was found to contain a total of eight relevant pages and that a total of 20 unique relevant pages was found by the three engines: the coverage value for Excite would be 8/20, *i.e.*, 0.40.

Mean values for precision, recall and coverage were obtained by *microaveraging*[11], i.e., the total numbers of relevant, retrieved and relevant-retrieved were summed over all the 30 queries, and the overall mean values calculated from these totals. The significance, if any, of the differences in performance between the three search engines was assessed by means of the Friedman two-way analysis of variance test[29]; this test has been used previously for the analysis of search-engine outputs by Leighton and Srivastava[30]. The aim is to test the null hypothesis that *k* different samples (corresponding here to the three different search engines) have been drawn from populations with the same median. The data are cast in a table consisting of *N* rows (corresponding here to 27 different queries) and *k* columns, with the data in each row being ranked from 1 to *k*. The Friedman statistic, F_r, is based on the sum of the ranks for each of the search engines[29]. Only 27 of the queries were used since the other three all involved at least one search for which the recall was undefined (this happening when there were no relevant pages at all available for retrieval by a particular engine).

The mean precision, recall and coverage scores for the three search engines are given in Table 1.

	Alta Vista	Excite	Lycos
Recall	0.56	0.66	0.57
Precision	0.46	0.34	0.25
Coverage	0.81	0.55	0.38

Table 1: Microaveraged retrieval performance for the three search engines.

When comparing the recall values, the calculated value for F_r is 0.71, which is not significant at the 0.05 level of statistical significance and which thus demonstrates no significant difference in the recall performance of the three engines. The corresponding precision value is 10.86, which is significant at the 0.01 level, with subsequent pairwise comparisons showing that Alta Vista was significantly better than Lycos but with no other significant differences. However, this finding is problematic in that while Alta Vista and Excite offer phrase searching as a default option, Lycos only introduced this retrieval facility after the start of the project, and this search engine would thus now be expected to give a higher level of precision for the queries searched here. Finally, the F_r value for the coverage figures is as high as 37.84, which is significant even at the 0.001 level; the subsequent pairwise comparisons demonstrated significant differences between Alta Vista and Excite and between Alta Vista and Lycos, but not between Excite and Lycos. Our results are hence in line with several previous studies that have noted the high level of performance of the Alta Vista system[5,21,22].

Chu and Rosenthal[5] have suggested that there is very little overlap in search outputs since the search engines seem to index different portions of the Web;

however, they do not appear to have conducted any additional searches, as we have done here, to verify the existence of relevant pages in the indices of other search engines tested. Our experiments suggest that there is, in fact, a considerable degree of overlap between the search outputs: for example, 104 of the total of 353 relevant pages found to be present in Alta Vista were also found to be present in Excite.

There are obvious limitations in the experiments reported here. Thus, we have used only a limited number of queries (albeit more than in many of the previous evaluations that have been cited) and these have all been in the general area of library and information science; again, the change in Lycos' search facilities means that our results for this search engine are already misleading. However, we believe that the actual values reported here are less important than the methodology that was used to obtain them. Specifically, we have shown that the pooled-recall approach used in the TREC experiments can equally well be applied to the evaluation of search-engine performance, if appropriate attention is paid to the particular characteristics of the Web. This enables the measurement of recall, as well as precision, thus permitting a more accurate estimation than heretofore of the retrieval effectiveness of Web search engines.

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APPENDIX I: The Queries

Strings enclosed in double quotes denote phrases.

1. "computer animation" software products cost comparison hardware specification
2. corporate intranets information sharing organizations Internet technologies "search engines"
3. "information audits" "information mapping" ""Information management" strategy policy
4. limitations problems "computer assisted learning" instructional multimedia higher education
5. postgraduate librarianship "information science" education "United Kingdom" course curricula
6. "virtual library" user education teaching electronic "information skills"
7. comparative evaluation effectiveness testing "search engines" "search tools"
8. guide etiquette electronic mailing Web pages
9. "Follett Report" academic library provision higher education information technology implementation "United Kingdom"
10. security problems networked medical records unauthorised use confidentiality abuse
11. "geographical information systems" GIS planning marketing business strategy development
12. methods criteria evaluation quality World Wide Web pages accuracy reliability integrity
13. digitization document collections scanning "optical character recognition" retrieval using "fuzzy matching"
14. benefits multimedia teaching science mathematics primary junior schools
15. "artificial neural networks" assistive technologies teaching mathematics children learning disabilities
16. "United Kingdom" parliamentary election results 1997
17. "Institute of Information Scientists"
18. "TREC" "text retrieval conference"
19. "University of Sheffield" "Department of Information Studies"
20. "Pitt Rivers Museum" Oxford
21. "freedom of speech" civil rights online "communications decency act" censorship Internet
22. "evidence based healthcare" journals bulletins newsletters Bandolier
23. electronic copyright intellectual property law Internet fair dealing
24. data visualisation environmental geographic information digital cartography mapping GIS
25. medical informatics computerised general practice primary care records
26. comparison effectiveness "text-based image retrieval" " content-based image retrieval"
27. "Countryside Commission" nature conservation protection coastal environments
28. graduate job vacancies careers recruitment education information IT libraries "United Kingdom"
29. year 2000 date problem old computer systems
30. health information travel precautions vaccinations medication anti-malarial drugs

Participative management in a university library: the case of Abubakar Tafawa Balewa University Library, Bauchi, Nigeria

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Abstract

The study explored the pattern and level of staff involvement in the management and administration of Abubakar Tafawa Balewa University Library, Bauchi: document survey, participant observation and the questionnaire methods were employed to gather relevant data. Results show satisfactory levels of staff participation in decision making through inputs during staff meeting, membership in various Library committees and the communication channels in use. Suggestions for improvement in the overall management and administration of the University Library were proffered.

Introduction

The human element in the management of a University library occupies a very strategic position in the order of things.

According to Rubin[1] 'People run libraries, they provide the essential services, process the materials, prepare the budgets and establish the policies and practices that shape the institution, and failures in library services are often failure to deal appropriately with human issues'.

The recent agitation for the democratization of our political and socioeconomic institutions has had and is still having a positive impact on academic institutions especially Universities. The unprecedented demand by university personnel for increased participation and involvement in the administration and management of Universities has led to the establishment, and in some cases, expansion of committees concerned with the smooth running of these institutions.

Consequently, membership in management and special committees, and emphasis on the use of effective communication channels for information dissemination in the Universities continue to receive increasing acceptability. This development has continued to generate new interest and attention in the management of university libraries.

Jones and Jordan[2] stated that 'Participative management structures and styles create conditions at work which enable staff to realize their potential, make greater use of their professional training, and thus improve the effectiveness of the services offered'.

Thus trends in participative management in Libraries emphasize the paramount place of recognition, consultation and involvement of all towards the realization of the library's goals and objectives.

Background to Abubakar Tafawa Balewa University

Abubakar Tafawa Balewa University was established as a University of Science and Technology in 1981. It belongs to the group of third generation universities established by the Federal Government of Nigeria.

Located in the Northern part of the country the University presently has five schools running various programmes. These include: the School of Agriculture, School of Environmental Technology, School of Engineering and Engineering Technology, School of Science and Science Education and the Postgraduate School. Other supportive academic and research units include a Computer Centre, the University Farm, the Centre for Industrial Studies and the Consultancy Unit.

The University Library established since the inception of the University is located in a serene and conspicuous area on the campus. To support the academic teaching, research and publication activities of the University is a well stocked Central Library with a collection of 45,018 volumes of books and 1,261 journals titles. The University is growing alongside the parent institution as partners progress.

Literature review

Management of human and material resources in organizations especially in a dynamic institution like the University has come to occupy a paramount position. The subject of Library Management has also continued to receive the attention of library managers, scholars and researchers.

Ifidon[3] observed that, 'In many libraries, the traditional hierarchical structure is being replaced by participatory management whereby there is a close co-operation between the head Librarian and subordinates in the setting up and pursuit of job related objectives.'

This development according to Ifidon tends to produce staff members who have job satisfaction, who can increase productivity and who are more flexible and more adaptable to changes.

Cowley[4] identified some of the changes that brought about a reconsideration of management methods, in particular, and the management of personnel in libraries to include '...Professionalization of Librarianship, unionization of professional staff, new technology, worsening economic climate, increase in specialist skills and greater fragmentation of work, widening range and higher quality services, and library growth and development.'

One of the major features that distinguishes participative organizations from others is the provision of opportunities for communication, interaction and influence across functional and status lines. In an article, Sheble and Hill[5] quoted Seashore as identifying the commonly accepted features of participative arrangements to among others include. '...a high level of communication among employees of all ranks, the ability of employees of all ranks to influence the goals of the organization, a high level of interaction among employees, and a high level of mutual confidence and trust among employees. All these, he stated, required the building and sustenance of organizational structures and substructures that are open to all.'

However, Dickinson[6] cautioned that, '...participative management or power sharing should not – and cannot, if it is to be successful – be an abdication of responsibility for the library on the part of administrators and managers in the name of democracy.'

In the same vein, Guttsman[7] stressed, 'the importance of developing in a library, alongside the formal and inevitably hierarchical management structure, a democratic structure in respect of involvement in library operations and in the mobilization of professional skills and subject expertise.'

Furthermore, Thapisa[8] postulates that, 'A type of management approach which is supportive as well as sensitive to the needs, frustrations and ambitions of the workers is highly recommended... and is likely to be more preferred in academic libraries.'

Methodology

The techniques used to generate data include document survey, participant observation and questionnaire.

A twenty-three item questionnaire was administered to sixty-two university library staff. Information solicited in the questionnaire covered personal data, awareness of library objectives, length of service, membership of committees, level of involvement in decision making and communication patterns in the library. The questionnaire was administered to all the library staff except those who were on one form of leave or another (e.g. study leave, annual leave, etc.).

Out of the total number of sixty-two copies of the questionnaire administered to respondents, sixty, representing a response rate of 96% were returned for analysis.

Results and interpretation

In presenting the results, data on quantifiable characteristics of respondents analysed include, gender, length of service, awareness of library objectives, job satisfaction, committee membership and satisfaction with communication pattern in the library.

Table 1 below shows analysis of data on sex categorization in the library.

Table 1. Category of staff by sex.

Sex	No	%
Male	51	85
Female	9	15
Total	60	100

Data on sex categorization of staff in the University Library shows that there are more males in comparison to the number of females. Thus, while there are fifty-one male respondents representing 85% there are only nine female respondents representing 15%. The finding here lends credence to Akintunde's[9] assertion that: '...Socio-politics and the cultural attitude towards female labour especially white collar jobs coupled with the predominant Islamic culture in Bauchi town which (perhaps until recently) does not tend to encourage female paid labour.'

Another important quantifiable characteristic of the respondents measured in this study is the length of service in the Library. Table 2 below gives a breakdown of length of service of respondents.

Table 2. Length of service.

No. of years	No. of respondents	% Total
Under 1	0	0
2-5	34	56.67
6-10	22	36.67
10 and above	4	6.66
Total	60	100

Finding on length of service of respondents as presented in Table 2 above shows that 56% of the respondents had worked in the Library for between two to five years, while 36% had served for between six to ten years. Only four of the respondents representing a mere 6% of the whole had served the Library for ten years and above.

Knowledge of library goals

An important segment of the questionnaire requested respondents to indicate whether they are aware of the objectives of the University Library. Every other thing being equal, a staff member who knows and understands the mission of the organization where he/she is employed, can easily be carried along in policy and plan implementation. Also Akintunde and

Shelbar[16] observed that where the personnel of any organization do not know the goals or mission of that organization, 'Such staff would operate and communicate in the workplace and environment more or less in a vacuum and therefore not see the relevance of choice of channels of communication, may not code and or decode messages meaningfully, and, may possibly, undervalue the timeliness of information transfer'.

In this study an overwhelming number of the respondents (90 percent) confirmed that they are aware of the goals and objectives of the library, while a mere 10 percent answered in the contrary. The degree of the respondents knowledge of lack of knowledge of the Library's goals is presented in Table 3 below.

Table 3. Knowledge of library goals.

Response	No. of response	% Total
Yes	54	90%
No	6	10%
Total	60	100

Membership of library committees

The University system operates traditionally with the help of various committees. Some of these are ad hoc while others are standing committees. The committee approach is an important aspect of the participative management style.

Thapisa highlighted the elements that are crucial to the effective application of this management approach to include consultation, communication and recognition of personnel. This ensures that decisions are jointly made, understood and accepted.

Staff participation in the management of the Abubakar Tafawa Balewa University Library is achieved through membership in committees, contributions at general and department staff meetings and the effective use of the internal channels of communication.

Table 4 shows that there exist eight different types of committees in the library. All these are internal library committees with membership cutting across every strata of staffing in the library.

Staff in the Library are grouped into three main categories viz: Academic Librarians, Senior Administrative, and Technical Non-Academic staff and Junior staff. Each group is represented in committees depending on its responsibilities, scope of operation, and the level of its activities. For instance, committees like the Library Academic Board, The Academic staff seminar committee and the Library Research committee have no junior staff members for obvious reasons.

Staff meeting

Staff meeting is another aspect of staff involvement in decision-making. According to Charlton[11]. 'Unless the more direct forms of participation are developed at lower levels, the indirect form, imposed at the tip, will never achieve the results which are expected from it, that is, the development of a pluralist approach to organizational decision-making'.

Staff meeting contributes a lot to staff development by creating avenues for participation in decision-making directed towards the realization of the Library's objectives.

At the Abubakar Tafawa Balewa University Library, general staff meetings are held twice in a session while sectional and departmental meetings are held on a quarterly basis. Copies of the minutes of sectional and departmental meetings are always sent to the University Librarian for follow-up action at that level.

The majority of respondents (85%) who cut across the three levels of staffing the Library confirmed that they actually contribute ideas at staff meetings. Also, of the number that contribute ideas at staff meetings 76.5% reported that their inputs at meetings were considered relevant and worthwhile. This gives staff a sense of belonging.

Communication

From the survey, the communication channels identified as being most frequently employed in the library include memorandum, the grapevine, intercom, and face-to-face communication. Respondents indicated that intra-organizational information are received through heads of departments/sections and from the office of the University Librarian.

The result shows that 61% of the respondents are satisfied with the channels of communication in the

Table 4. Patterns of committee membership.

Committees	Academic Staff	Snr. Non-Academic	Junior Staff	Total
Library Academic Board	16 (100%)	—	—	16 (100%)
Library Consultative Committee	2 (40%)	2 (40%)	1 (20%)	5 (100%)
Library Strategic Planning Committee	5 (83.33%)	1 (16.67%)	—	6 (100%)
Academic Staff Seminar Committee	3 (100%)	—	—	3 (100%)
Library Research Committee	4 (100%)	—	—	4 (100%)
Social Welfare Committee	2 (33.33%)	2 (33.33%)	2 (33.33%)	6 (100%)
Exhibition Committee	4 (20%)	5 (25%)	11 (55%)	20 (100%)
Consultancy Services Committee	3 (100%)	—	—	3 (100%)

Library, while 32% favours improvement in the channels. However, it was discovered that the communication pattern being operated in the Library is satisfactory.

Discussion and conclusion

The clamour for wider participation of the rank and file in decision making has continued to generate interest among managers of human, financial and material resources in the work place.

As a managerial strategy, participative management cannot be said to be the only panacea for library management, but its focus is in tune with the new approach to the way things are done in academic Libraries nowadays. From result obtained in this study, it has been established that avenues for staff involvement in the management of the University Library exist in one form or the other. These include the committee system, staff meetings and pattern of communication in the Library.

The committee system as practised here has helped greatly towards the coordination of activities and initiation of new approaches to goal achievement. Though used for specific purposes as dictated by circumstances, occasionally delays are associated with committee operations.

Staff general and departmental meetings are avenues for consultations, and findings from this study revealed that the library management has continued to employ this in the administration of the University Library. However, at the departmental and sectional levels the meetings need to be more regular.

On the pattern and channels of communication, it was discovered that the present arrangement is satisfactory. However, with the expected growth in the Library, some fine tuning may be required.

On the whole respondents express satisfaction with their level of involvement in decision making in the management of the Library. While results obtained from this study shows that personnel at the Abubakar Tafawa Balewa University Library are involved at different levels of decision making, more efforts need to be made towards staff development through in-house training and granting of non-monetary incentives to prepare them for higher-challenges.

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ASLIB THE ASSOCIATION FOR INFORMATION MANAGEMENT

SINTO and co-operation

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Paper given to the Aslib Northern Group, Annual General Meeting, 1997.

Introduction

In this presentation I will explain the work of SINTO and put it in its national context.

SINTO is a co-operative scheme for libraries and information services in the South Yorkshire and North Derbyshire area. Our goal is promote and develop library and information services through co-operation, planning and partnership. Founded in 1933, SINTO now comprises 5 public library authorities, two universities, 3 colleges and about 40 other organisations. We are funded by the subscriptions paid by our members which are related to their size.

SINTO provides a local inter-library loan scheme, networking training/CPD activities, a forum for strategic planning and a service of information, advice and referral. SINTO maintains a union list of periodicals (SULOS) and Sheffield Business Library is an important source of standards for local businesses. As far as document delivery is concerned we do not attempt to compete with the regional and national systems especially in terms of speed of delivery, but we do provide a low-cost alternative which is of value to our members.

Networking and training are increasingly seen as important aspects of our activities. SINTO has a number of Groups for different subject areas which meet regularly to exchange information and plan co-operative activities. As many national training events take place in London SINTO is very keen to organise local events. Wherever possible this is done in partnership with other professional bodies.

Through our Groups and the Executive Board SINTO provides a forum for organisations in Sheffield to get together and develop a local strategy. An example of this is the Access to Libraries for Learners (ALL) scheme. This involves the academic and public libraries and ensures that students and members of the public have access to all the libraries in the scheme. As you might know, allowing outsiders access to academic libraries does create problems and in many areas the public is denied access or at least not encouraged. The ALL scheme does not overcome all the problems but it is an important initiative rooted in the principal of local co-operation.

SINTO employs a staff of two, a Director and an Assistant. We can provide information and advice or direct people to the local sources of information. This is of particular value to local companies where the information manager may not be a professional librarian and is not part of the usual professional networks.

The National Context

I have described how SINTO operates but it does not exist in isolation. I now want to look at LIS co-operation nationally.

SINTO is a LIP – a Library and Information Plan. LIPS were set up in the late 1980's as a way of developing co-operation between different LIS sectors. They were defined as:

A management plan which co-ordinates all the library and information services in a given geographical or subject area and involves all information providing organisations The purpose of a LIP is to provide a framework within which planned co-operation and co-ordination can take place.

They were modelled on existing schemes such as SINTO. The coverage of LIPs both geographical and by subject is patchy and several LIPs have folded. SINTO is unusual in being funded by subscriptions. Many LIPs have very low or zero subscriptions and the costs are absorbed by the member organisations. However this does make them vulnerable to cuts.. LIPS have an umbrella organisation – the National Forum for Information Planning (NFIP). This acts as a self-help group for the managers of LIPs but also has the role of promoting the concept of co-operation and planning at a national level.

LINC

NFIP used to be called LIP-LINC and was part of LINC – the Library and Information Co-operative Council. LINC was established in 1989 by LIS services, public, academic and national to promote co-operation and planning nationally and to influence government policy in this area. LINC has recently re-structured itself, partially to save costs and partially to redefine its role in response to the establishment of the Library and Information Commission. But before I look at this I need to pause and take a sideways step because there is a whole area of library co-operation that I have not mentioned.

Regional Library Systems

The whole of the British Isles is covered by Regional Library Systems. Seven in the UK and one each for Scotland, Wales and the island of Ireland. These are co-operative schemes for public library authorities, academic libraries and other organisations that choose to join. They provide Union catalogues, transport schemes, and co-operative purchasing schemes. There is a RLS for Yorkshire and Humberside and for the East Midlands which between them cover the SINTO area and in theory duplicate our activities. The umbrella organisation for the RLSs is CONARLS (Circle of Officers of National and Regional Library Systems) which has the role of promoting library co-operation at a national level, and is a member of LINC.

LIC

In 1995 the government established the Library and Information Commission to be a national focus of expertise in the field of library and information services. Its core objectives are:

- to provide a single coherent and efficient source of advice to government on all issues in the field
- to draw the government's attention to emerging issues and to suggest appropriate responses to them.
- to provide all advice on the basis of as full a process of consultation within the library and information community as necessary and as time allows.

The Commission's remit also includes advising the Government on the development of a national information policy. The Commission has recently published its mission statement *2020 Vision* and I do recommend that you look at this.

A vision for information in the UK is very important. All of us have a part to play in shaping and achieving this vision. And this brings me to my final point. The complex of organisations I have mentioned which are concerned with co-operation and the development of a strategic approach to information are not the whole picture by a long way. I have not even begun to mention the range of professional organisations such as The Library Association, Aslib and the IIS*. Information professionals it seems are very good at creating organisations committed to co-operation, networking and professional development.

But is this diversity a source of strength or weakness? At worse, I believe, it is simply inevitable. You can not hope to impose uniformity on any area of human activity! At best the diversity gives people choice and therefore encourages more people to become involved. However, we must recognise the problems. These are:

- Duplication of effort. It takes a lot of work to set up and run a group. The more groups there are the more wasted effort there is. Can we afford this?
- Rivalry between groups. Different organisations inevitably see themselves as being in competition and this may lead to conflict. Does this help the profession as a whole?
- Giving an unclear or conflicting message to decision makers. One of the most important tasks facing the profession is to influence the decision makers. This is never easy, but it is made more difficult if we are not speaking with a single voice.

I am not proposing mergers between existing professional groups but I do feel that the profession needs to give a higher priority to working together. We need to seek out areas where we can agree and can work together. Organisations should be more pro-active in looking for areas of agreement and co-operation both nationally and locally. Partnership means that we can meet the needs of our members more efficiently and can promote the profession more effectively. I recommend that all professional bodies and groups should adopt as one of their main objectives the goal of seeking out and working with other bodies and should appoint liaison officers to do this.

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* Institute of Information Scientists.

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Editorial

One of the papers in this issue (Alan Wheatley and Chris Armstrong on metadata) continues a thread begun in the previous issue by Sarah Clarke and Peter Willett, who wrote on estimating the recall performance of Web search engines. It is useful to be able to publish two papers so closely linked, in consecutive issues.

'Metadata' has had a bad press as a word, being seen as either an arcane term used only by IR researchers; or as a rather posh way of describing what is otherwise boringly normal. All it means is data about data or, to use another posh term, a first level of abstraction from the original. Metadata means indexes, catalogues and, in this instance, abstracts. (You can of course have a second level of abstraction, with indexes of indexes, catalogues of catalogues, and abstracts of abstracting resources. This can continue for ever, and was once the subject of a brilliant SF story in which the world no longer produced knowledge or information, but only increasingly dense and impenetrable levels of metadata).

At the root of the problem on which both papers are founded is the inherent lack of structure in Web documents. The library world has become accustomed to the highly structured approach of MARC records, where every possible data element has a 'tag' or field in which it is situated; and in which the context of the data element is displayed by the tag. HTML offers no such structure. Thus searching Web documents directly means that there is no way of limiting the field of search to (say) a title, an author, or some subject descriptors. Words are found as 'hits' provided they appear somewhere in the document, irrespective of their function or significance. (Note that, as explained in the paper in this issue, different search engines use different parts of documents as the sources for indexing terms, and different amounts of text, when extracting indexing terms from them.)

The information profession has offered a solution, or rather two solutions, in the form of the Dublin Core and the Warwick Framework, which provide a sort of minimum data-set/format for Web documents. This produces something like a standard bibliographic description. Anyone who has ever tried to impose even a limited form of standardisation on authors will know that they are very unlikely to comply, particularly when they see no direct benefit to themselves in doing so. We can therefore expect that Web authors and site managers will continue to put up material much as they do now: librarians and information specialists will have to continue to make what they can of what is offered. Fortunately the profession is good at this post factum imposition of order – it is arguably true that this is actually all that the profession is about. Work on thesauri and clumping and classifying schemes for Web sites and resources is also based on trying to create order from chaos without the possibility of applying the order from the start.

On another level it is refreshing to read the conclusions of The Internet: it's early days... (this issue, pp.214-216) which goes some way to pricking the bubble of hype, over-promotion and omnipresent technomania that usually surrounds discussions on the nature and future of the Web. The realistic (and sometimes sardonic) comments by journalists of the impact of the Web ('Just another resource') makes comforting reading.

Finally, away from all specific technologies, the paper by Stuart Hannabuss on Jean-Francois Lyotard is a sanguine reminder that underneath all of the how-to-do-it concerns of information supply and service, we must remember and consider the why-to-do-it aspects of the nature of knowledge and knowledge generation. We do not see enough of this sort of reflective analysis in the profession.

Peter Gillman
Editor

Information and the law

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Abstract
Information laws are looked at as they operate with analogue media, and then with digital services. The changes in law are related to use patterns and a solution proposed to improve access. This requires the development of a legal equity of access to information. Conditions in which this would apply are outlined.

The areas of law considered are intellectual property rights, rights relating to personal information, and law protecting against breaches of confidence.

Introduction

We are all users of information, whether for leisure or for work and whether or not we are also creators of knowledge or of information products. The user community is concerned about information and its creation, communication and use. The laws of major concern are threefold

- intellectual property monopoly rights – copyright, patents, trade marks and designs,
- personal rights – data protection and privacy,
- and the law which protects information against breaches of confidence.

The crucial questions seem to be as follows.

- How have information laws developed with analogue media?
- What changes in the use of information are being wrought by the use of electronics?
- What corresponding changes in the law are being developed in parallel to these changes in use?
- What are the prospects and perils for users in these developments?

It is also possible to look for desirable trends in the provision of information services and to see how these could be incorporated into our proposed legal framework.

History – law with analogue media

Western countries – so called – are organised in democracies, a major characteristic of which is relatively free transfer of information. We have individualisitic societies, and as much as possible of the many and various ways of communicating information is left to the individuals and organisations concerned to do for themselves. Many industries have grown up in each country to deal with different forms such as print, broadcasting and audio-visual media.

All these areas of law have evolved slowly. Rights are granted by governments and therefore need to have justifiable benefits to all concerned with a minimum of disadvantages. Consistent with this view, information laws can all be seen as mediating balances of interest between exploitation to benefit a sectarian interest and the wider public interest as perceived by governments at the time.

Intellectual property rights

Since we live in a capitalist economic system, it is not surprising that the dominant treatment of information products is based on personal property concepts which are regulated by intellectual property laws. These apply equally to knowledge and to entertainment and cultural resources... It is required that the investment both in producing and distributing works and in the creative content is valued in terms of money, and that use is duly paid for. The purposes and importance of the uses made and the intrinsic value of the exchanges are not considered as such, merely the degree of demand.

There is also an aspect of control involved, the right to give or withold permission. This is intrinsic to the concept of exclusive rights and plays its part in the economic system. But it also has a non-economic aspect which will be dealt with seperately.

Although we will now concentrate on copyright, the economic effects are duplicated by the other areas of IPR. They form a seamless web of protection for different facets of a product and can be used simultaneously or in relays.

Copyright

In intellectual property, copyright is the law which seems to have the widest application, and has certainly attracted the most controversy and activity in its evolution to the digital age. Copyright law was created in Britain as an economic instrument to help foster an orderly market in printed works. The first Act of a modern nature was in 1709 and later legislation refined the pattern, dealing with other technologies and with the rights of producers as well as of authors. However, the government in a democracy does not hand out monopolies without justification of benefit to the affected members of the public, so the monopoly rights enjoyed by publishers and authors were balanced by expectations that the public would then have efficient and effective access to the knowledge and culture being produced. It is also the case that our economic system has favoured competition in trade over monopoly rights. On these grounds too, the granting of exclusive rights has had to be balanced by weighty advantages in justification of imposing a monopoly.

A concept of 'fair dealing' in the public interest was introduced to override protection, thus setting a pattern of strong rights balanced by exceptions for users. Copyright control exists across the entire range of media, whether carrying information for knowledge or for entertainment – and by Crown copyright this covers government information too. The USA and other countries, mainly ex-British colonies using the common law system, took up this model with variations. A particularly striking and relevant feature is that in the US system fair use is a general statutory defence against infringement. It gives a non-exclusive list of such uses and factors to be taken into account in judging if fair. This is a simple concept and flexible in practice. In contrast, the UK fair dealing provisions are utterly rigid and spread among numbers of categories according to type of exception. There are 49 sections on exceptions to infringement in the Copyright Designs and Patents Act 1988. Such a degree of precision is surely self defeating and unfair on users to put the onus on them of negotiating such a jungle of terms[5].

The alternative approach of Continental Europe is that the monopoly right reflects a 'natural' ownership of creative products as an extension of one's personality. The main effect of this is to strengthen moral rights and possibly to strengthen the bargaining power of authors against publishers. The balance with distributing works to the public applies as in the common law approach. Thanks mainly to the Berne Convention, the structure of strong exclusive rights for producers balanced by some exemptions for users is the same for all countries.

The commercial imperative of rights holders needing to satisfy their markets has meant that, overall in the analogue world, the balance has been maintained. One has to pay for copies and get permission to make them, but this is usually possible and can be circumvented by use of books in libraries, fair dealing copying, use of radio and TV etc. So an interested member of the public, however marginalised or disadvantaged can find a route to information and culture. Problems at this level are more with the motivation and skills implied in the word 'interested'.

The pattern of evolution for copyright law has been for rights holders to press for extensions to protection as new technologies were introduced, and these were linked to additional exceptions for users to maintain the balance, at least approximately[4].

Personal information

There are also non-economic values attached to information and relating to its accessibility. These affect personal information, knowledge in general and the operations of commercial entities. They are seen in laws of privacy and data protection which apply to individual people and the laws of breach of confidence which can apply between individuals and also in reference to the operations of companies.

Note that there are also non-economic values attached to copyright. Apart from moral rights which won't be discussed further, the giving or witholding of permissions to copy are considerations that can go beyond the economic. For printed materials, because they are in the public domain, access is available through libraries and almost always available given some organisational and searching skills. For non-print analogue media there are archives for film and sound recordings, but no general archive and no requirement for completeness.

Privacy type laws apply via the general recognition of a right for individuals to be left alone to enjoy their 'private lives' in peace. This is enshrined in Article 10 of the UN Convention on Human Rights where it is combined with Article 8 on rights to exchange information with others and to have access to knowledge and culture in general.These are also in balance with opposing rights. The state and commercial concerns need access to personal data to operate as they need to. Newspapers, governments and a range of other bodies also want access to material which is not just data but is also to do with one's private activities. Different countries have a range of laws to draw the boundaries between justified access and justified negation of access. As befits a non-economic value system, the things regarded as sensitive and private vary considerably from country to country.

Confidentiality

We do not have general privacy laws in Britain, and data protection is a recent statutory creation, but we can see how a more general right might function by looking at the law of breach of confidence. Uniquely in Britain this law is formulated in the same way for personal details such as the secrets of a marriage[2], and for industrial secrecy (Coco v Clark 1968), such as when an inventor discusses an idea with a possible collaborator, has no patent for protection, is rejected and later finds out that the industrialist has come up with a new product incorporating the new idea but with no acknowledgement. There are similar problems when an employee leaves a firm and takes an idea or other information with them. The publication of memoirs as in 'Spycatcher' also fits this category[8]. The author had signed the Official Secrets Act and this was considered still to bind him irrespective of all other considerations. In all such cases the law concentrates on the relationship of confidence and looks for a promise to keep the information confidential. If such a promise is then broken, the perpetrator is guilty of having broken their word and betrayed an expectation. Such laws are known as 'equities' – as demanding justice.

Equitable principles can affect all areas of our lives and have the advantage of being very flexible and sensitive as they require consideration of individual circumstances. They are normally developed in case law, but the principles may then be codified in a statute.

Present-day ditigal services

Digital technology seems to have lead to upheavals greater than any other new technology. One may ask why.

With each new technology, copyright owners pressed for extensions to their rights intended to allow for the same degree of protection in the new environment. New exemptions would help restore the balance for users. With digital technologies, rights holders have asked for considerable increases in their rights. (For instance, in many teaching organisations, customised 'course packs' of readings would be created by a lecturer, photocopied and given or sold to the students. Appropriate royalties were negotiated for these, but the publishers and the Copyright Licensing Agency on their behalf claimed the right to a separate royalty when the materials were to be distributed in electronic form. By setting this very high, the use of electronic distribution has been stopped in its tracks before it could ever get underway.) Sheer inertia in the copyright industry as a whole has lead to strong demands from a wide range of well organised and vociferous rights organisations.

Meanwhile, governments have become remote from users' concerns. The information industry has become a global one and governments are concerned with balance of payments and other global measures and rather neglect the local micro interactions that produce these global results. In Britain and our fellow EU countries this is exacerbated in that the EU, the level at which meaningful negotiations now occur, is not a nation state and will pursue economic interests more vigorously than the social needs of its citizens which are the concerns of states. However, as a counterbalance we may note that the preamble to the new WIPO copyright treaty stresses the need 'to maintain a balance between the rights of authors and the wider public interest particularly concerning education, research and access to information'[7].

Particular issues

The result of these factors together has been most potent in the EU where strong legal protection is either in place or planned. Electronic transmissions will be protected legally to the extent that no one will be able to read an electronic document, browse through it or anything whether in a library or a shop or at work or home, without permission or payment. This is because transient copying is required to view on a screen and this is to be regarded as a restricted act. Economics may dictate that it's not worth suing a browser, but a publisher may do so none the less to publicise their rights and as an act of intimidation. Libraries and other providers will be unlikely to risk liability in these circumstances.

In combination, legislation will also protect technical protection – ECMS technology which will control use and take payment electronically. Various EU and national projects are looking at these schemes. One effect is the likely destruction of fair dealing in electronic environments. All transactions of a type will be lumped together and a price set, and there will be no room for individual circumstances as required by the principles of fair dealing. An example of this is clear in the electronic document management system being developed at Southbank University[1]. In this system, documents will be held in electronic form and produced as users demand them. There will be a technical manager which will hold details of users, check against a password and then allow access and use as programmed. Each user will have their status as staff, student, researcher etc recorded, but decisions will be by category of user, there will be no scope for variation for the temporary circumstances of one user.

Outside the EU copyright has fared slightly less well. These proposals were challenged in the US and WIPO declined to put transient copying protection or ECMS schemes into the Berne Convention. Australia and NZ are likely to take softer approaches allowing for non publishing uses of electronic documents to be exempted as fair dealing[6].

To summarise, it is clear that copyright is greatly overprotected and will be even more so if present trends are followed. The balance of interests which is the rationale of copyright law is greatly distorted and needs to be rebalanced explicitly. This last is necessary as a democratic procedure so that all participants can know what the law intends rather than hedging and adjusting in an ambiguous fog.

Privacy and data protection rights are less affected qualitatively, but it is the easy reproduction and movement of electronic data that so greatly threatens individual privacy on many fronts.

Importance

A crucial issue is that all areas of information law need to be treated together. It has been argued that none of these effects are that great, that the laws will adjust under pressure from governments and users and that a new equilibrium will be reached with no need for great changes. However it seems unlikely that this could be the case, because the growth in control via copyright affects personal information regimes too. I will then argue that the scenario of breach of confidence law shows us a possible resolution.

For intellectual property laws, it is clear that electronics gives too great a degree of control to the economically most powerful of rightsholders. The balance with users is upset and EU governments are not interested in righting it because they are looking at a macro international level instead of at the micro home based level. Although this discussion has been about copyright, the same effects apply to all IPRs, they flow into each other in that trade mark and design protection are used freely as alternatives to copyright and patents are too, though at a slightly greater distance.

But, there is a second set of effects concerning non-economic regimes. When a newspaper writes a privacy-breaching article, this is protected by copyright. When a database of personal data is constructed and is then used or misused by its owners, the database is also copyright-protected. The copyright in both cases protects the economic right. Privacy type laws provide the counterweight protection for the individuals whose data is being covered and the public users make a third set of interests.

So when copyright is too strong and overbalances with the users, it also drags the relationship of users with personal type rights into imbalance. This is because the over strong copyright gives the commercial exploitation of that material precendence over personal interests. So the public users are pushed into violating the privacy of information or data subjects and the balance is unstable. Therefore both property and privacy type rights are distorted by electronic developments and need radical reform.

A possible solution – expectation of access

A way to break the deadlock would be to strengthen user rights in both the property and the personal information domains and to do so in a unified manner so that both sectors react in unison.

The consensus view seems to be that current laws will solve all problems and yet we see fragmentation, uncertainty and inconsistency. I put the following suggestion forward to encourage unification and consistency.

The need applies to information held in electronic form, but there is no need for the rules to have an arbitrary cut-off, they can apply to all material.

An information equity

In the law of confidence, an equity is applied, that of expecting the confidence to be kept. It is formulated purely by case law therefore taking individual circumstances into account.

The expectation common to all the situations we are considering is that of access to the information. This needs to be considered seperately for non-personal and for personal information.

Non-personal information

For information in general (ie not personal), protected by copyright, this is intended to impart knowledge or to be a cultural experience. An equity of access can be applied to such material.

In cases where the information is created using public funds or where there is a statutory requirement to provide or supply information, then it can be argued that the public should be given access as of right. Not freely, but at cost and with the possibility of limited free library provision to ensure access for all.

Material produced from publically funded projects would be published electronically with costs covered by these funds, and likewise for information required to be produced and supplied to the public. These could have special electronic codes attached to them so that management systems would allow them to be copied at cost.

Other information would be available as now with appropriate permission, but there could be fair dealing type exceptions for education, research, news reporting and other worthwhile categories. These fair dealing exceptions would allow research, and this can encompass any level of finding out that an individual may be involved in. This would ensure that all types of user are protected, not just those in recognised positions in work or in certain interest groups.

However, in Britain at least, one important additional adjustment required would be to ensure that this right is guaranteed, not brushed aside by blanket licensing agreements which require payment by type of user rather than by circumstances of use. The primacy of contract ensures that ideas of copyright can be brushed aside by individual contracts, but does not recognise that the users dependent on one contracting party may be unable to have their needs recognised adequately when such contracts are drawn up.

Personal information

For personal information, the subjects want control so that they can prevent gratuitous publications.Users of the material also need a right to require publication where appropriate. Therefore the equity would function as an expectation, but in this case an expectation of holding the balance. Publication would be allowed only when appropriate for the intended use and privacy would take precedence unless there were a countervailing interest in these revelations. So the rules would be different but the mechanism of equity the same as in the more general case.

A statute to establish this equity would describe the various expectations and the conditions under which each type of expectation would be raised.

In conclusion, a more positive right of control over information given to the general user and to personal data subjects will help strengthen the weaker side of the balance of interests inherent in all areas of information law. It is to be hoped that the consistency and predictability available in this approach will encourage its uptake by the legal profession.

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Metadata, recall, and abstracts: can abstracts ever be reliable indicators of document value?

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Abstract:
Abstracts from seven Internet subject trees (Euroferret, Excite, Infoseek, Lycos Top 5%, Magellan, WebCrawler, Yahoo!), five Internet subject gateways (ADAM, EEVL, NetFirst, OMNI, SOSIG), and three online databases (ERIC, ISI, LISA) were examined for their subject content, treatment of various enriching features, physical properties such as overall length, and their readability. Considerable differences were measured, and consistent similarities among abstracts from each type of source were demonstrated. Internet subject tree abstracts were generally the shortest, and online database abstracts the longest. Subject tree and online database abstracts were the most informative, but the level of coverage of document features such as tables, bibliographies, and geographical constraints was disappointingly poor. On balance, the Internet gateways appeared to be providing the most satisfactory abstracts. The authors discuss the continuing rôle in networked information retrieval of abstracts and their functional analogues such as metadata.

In a recent article, Clarke and Willett[1] looked at the effectiveness of Web Search engines such as AltaVista, Excite and Lycos, examining recall and precision across these three engines. Neither in their study nor in their review of some 17 earlier evaluations are there any details given of the search algorithms used by these search engines in locating the sites they include or of the indexing mechanisms subsequently used to provide access to them. As they say, 'the spider programs associated with different search engines adopt different criteria for exploring the Web and for selecting the pages that should be indexed'. The research conducted by Clarke and Willett was able largely to ignore this aspect because their methodology was essentially comparative, viewing the results from one engine in the light of the sum of the results for all of the engines tested.

Information on how Web sites are selected for inclusion in these vast catalogues is scarce; some spiders or crawlers simply follow 'trails' of URL links and it is clear that no selection criteria are applied. Similarly, there is little documentation on how the included pages are indexed for subsequent searching, with such documentation as is available on their help pages concentrating on how to get the best from the searches and the power of the underlying software.

Within the body of a Web page, there is no provision for fielded data and so it is not possible to search, as one might in conventional databases, for title words, indexing terms, publication date, author or corporate source. Even where the layout of a page clearly shows a title or an author, there is no way to limit searches to these parts of the page. Thus a search will discover the search term(s) with equal ease in the very final paragraph, in an explanatory footnote or in material found near the top of the page. With the advent of metadata, a slightly different approach is achieved. Metadata allows the inclusion of attribute-value pairs—in the Dublin Core, for example, attributes such as title, creator (or author), subject (keywords), description, publisher, other contributors, date and resource may all be assigned values. However, as metadata is not displayed and there is often no publisher/authority to impose constraints, the keywords and description pairs can easily be abused and seeded with terms designed to gain them high apparent relevance or frequent location. Most search engines display the sites most relevant to the search first (in this context, relevance normally means the sites indexed by the largest number of search terms) but while this works crudely, there is still no means of assessing performance and reliability.

Thus, one of the reasons lying behind the variable performance of search engines has to be the variability of the material being scanned. There is, as yet, no standard for labelling networked resources, and while work continues on metadata, actual use of metadata in the head area of Web pages is still uncommon and inconsistent. The Dublin Core and the Warwick Framework stipulate a limited set of data items akin to a standard bibliographic citation but this will not be found in most Web pages. As Jizba[2] notes 'it would be highly useful if abstracts or summary notes were routinely applied to cataloguing or metadata for

Internet documents and documents in other databases.' And of course, it would be highly useful if we could be assured that the search engines would, in some predictable way, make use of the metadata supplied—but some engines accept only the first 25 words of a description while others ignore descriptions of over 25 words. Even if every publisher of Web resources were to include an identifiable abstract and this, with the keywords, was to be used properly as the primary search key, the variability of their approach and style, and of the information they included would render the result almost as unreliable as relying on the first sentence of the resource itself.

The rôle of abstracts in a networked environment

The current and potential rôle of abstracts can be illustrated by analogy. Relative to the Web, search engines and catalogues exist in much the same positions as conventional abstracting and indexing services to conventional paper documents. Likewise, the search engines' automatically generated document extracts and the Web catalogues' resource descriptions are to the Web searcher what more formal abstracts are to the printed index and online database searcher. But such a functional parallel does not signify an absolute equivalence of structure and content: browsing through a Web catalogue's descriptions and the abstracts from a traditional printed or online database will soon reveal differences in size, language, content, formality of treatment, etc. What will not be revealed is the precise nature and extent of these differences.

Once upon a time, every information worker knew that all abstracts had only one general form: they were commercially produced and printed on white paper, they were bound between hard covers, and their contents were precise summarisations of larger items. ANSI's *American standard for writing abstracts*[3] defines them more generally and more usefully as 'an abbreviated, accurate representation of the contents of a document.' The diversity of modern electronic documents has bought us to a state where this is no longer the whole truth. The abstract's function for these newer documents must often be served by a diversity of newly developed 'micro-texts' which may be inspired by, or automatically extracted from, a source document. Functionally, these micro-texts are equivalent to the abstracts of old. Some widely used examples of these new micro-texts are:

- AltaVista's simplistic sampling of the first parts of web pages.
- Yahoo's one-line or two-line characterisations of extensive web sites.
- Infoseek's more 'intelligent' extraction of text from the body of pages.
- Broad summarisations of resource collections covered by information gateways such as ADAM and SOSIG.

In an attempt to define the successes or failures of conventional abstracts and the new micro-texts, the eLib MODELS project commissioned a supporting study which would explore the significant 'differences' seen in abstracts, especially those found in electronic information sources (a full report is available[4]). If, as Lorcan Dempsey has suggested, Internet subject trees are to exploit metadata additions to invisibly simulate fields such as author and title that users from the 'non-electronic' world already find familiar and useful, it was necessary to see how this could best be done[5].

While a full investigation of a variety of abstracts would probably have two main areas as its 'primary' stream (i.e. the ease of use and benefits, and the costs and skills needed for creating abstracts), a study of these two areas demands access to more than the information within the abstracts, and could not be adequately investigated within the constraints of a short supporting study. Consequently the study concentrated on the abstracts themselves, and used only data found in the abstracts or in abstract producer's own documentation, which allowed useful inferences on abstract quality and their likely value to users, and introduced the abstract producer's viewpoint. The project compared the abstracts or micro-texts from traditional print and online sources (ERIC, ISI, LISA), commercial Internet subject trees (Euroferret, Excite, Infoseek, Lycos Top 5%, Magellan, Yahoo, WebCrawler) and commercial and non-commercial Internet gateways (ADAM, EEVL, OMNI, NetFirst, SOSIG).

Measuring abstract quality

The areas of abstract content and quality are widely, if intuitively, acknowledged by abstract users and producers. They were identified by Tenopir and Jacsó, in an admirably clear article[6], are discussed at some length by the ANSI abstracting standard,[3] reiterated in Wheatley and Armstrong[4], and occur in more theoretical studies by Molina[7], and by Fidel[8]. For an earlier generation, these points were established by important studies in the early 1960s: Borko and Chapman[9] very firmly identified the major aspects of abstract content, and the value of these contents was validated by Resnick's[10] slightly earlier study of relevance prediction from abstracts.

With this background, the project methodology examined the character of electronic abstracts (informative, indicative, reviewing or critical), ultimate source, readability, any enriching qualities (indication of source, date, a rating system or a consistent 'structured' approach), factors fitting or limiting an abstract to a particular audience (such as use of jargon), explicit quality claims, and the general presentation. Three broad areas were recognised:

- The physical and readability properties of abstracts, including overall length, word and sentence length, and readability scores.

- Coverage of subject themes selected from document texts.
- Coverage of enriching or special aspects of the original document, including bibliography; tables, formulae, and figures; and any geographical constraints on the source's coverage or likely relevance.

Additional work was undertaken on database producer guidelines to abstractors but this is not reported in this article.

The sparse literature on abstracts gives no guidance on sampling criteria for an investigation into abstract content and value, indicating a conservative sampling scheme should be preferred, so the project sought the largest possible sample: about 30 satisfactory abstracts from each database examined. In some cases, database samples were reduced during analysis, because only subsets of data were being studied or because unsatisfactory records were eliminated.

Readability of abstracts has always been seen as an important measure of abstract quality, and the convenience of dealing with machine-readable electronic abstracts was a powerful argument for exploiting the ready availability of readability scores and data from modern word processors. Mechanised measurements of readability offered the project an opportunity to penetrate the unbroken entity of the abstract, and were the only practicable way for a short-term project to make any internal analyses of abstract morphology and content.

Other workers have been attracted by similar circumstances. Tenopir and Jacsó[6] used the Grammatik grammar checking software to derive their readability scores. They noted some cautions about properly preparing text for readability tests, such as stripping out spurious carriage return/line feed characters, and the need for care in interpreting results. For instance, the software may regard an author's initial as a sentence (because it starts with a capital letter and ends with a point and a space). But overall they were clearly satisfied with their use of the tests. In muted contrast, Hartley, Trueman and Meadows[11], accepted the use of tests in broad principle but stressed the simplistic assumptions behind what are essentially ratios of common basic text properties, and they also noted many interpretation difficulties liable to separate true readability levels from the measured levels. Hartley and Sydes[12] echoed these reservations but thought readability tests can usefully contribute to comparison of bodies of similar text samples. In another article[13] they showed that, despite supposedly performing the same measurements and calculations, different readability programs gave different estimates of the readability of the same texts.

Nothing in the results from this project contradicts these earlier findings. The readability scores were enlightening, but they were sometimes varied and erratic, and seemed often to show wide score differences for texts not easily perceived as being markedly different in character. Nevertheless, applying several different readability tests in parallel allowed some mutual checking between test results, and the tests were vital in facilitating the comparison of several hundred abstracts.

It is not possible here to represent all the data collected during the project. The remainder of this short article offers an overview of abstract readability, a review of content, and a summary of abstract style. This is followed by a short summary of the authors' conclusions.

Abstract readability properties

The importance of abstracts is an academic consideration if users don't read them and understand them as their writer's intended. Thus the readability of abstracts is a very important factor in allowing users to comprehend their full value, and the readabilty tests found in many standard word processors can be useful gauges of this factor. These tests quantify and relate different aspects of texts, most commonly word length and sentence length, and each of the four tests used by the project seemed to have its own strengths and weaknesses.

All the tests operated by calculating relationships between factors such as word and sentence length, and syllable counts and sentence length. One of the tests, *Flesch Reading Ease*, generated scores between zero and one hundred, with the project's abstracts having test scores of about 30 ('standard writing' scores 60-70), corresponding to text of undergraduate level. The other three tests, *Flesch-Kincaid Grade Level*, *Coleman-Liau Grade Level*, and *Bormuth Grade Level*, used a nominally standardised scoring system with results expressed as American school grade levels. With the test abstracts, these three tests also generated scores of about undergraduate level, but, Flesch-Kincaid usually scored about 13.0 (say eighteen years), two or three grade-years below Coleman-Liau (16.0) and a couple of years above Bormuth scores (11.0).

The reasons for these (quite consistent) test discrepancies are not readily explicable, but they are probably concerned with subject or other differences in the test material, possible infringements of the reading tests' assumptions, and weaknesses in the word processor software. Paragraph and sentence identification are particularly suspect issues – with no trace of humour, the project's report was digested by readability software and labelled as the proud owner of 1,719 paragraphs and 932 sentences! However, the impact of such problems is very difficult to assess.

A usefully simplified summary of abstract 'readability' across all the four tests can be constructed by summing the four sets of readability rankings to produce a single-number cumulated rank score for each database, to generate a table such as the one below. This can be done by assigning a rank number for each readability test result (1 for the best result, 2 for the second best, and so on), then totalling each database's four rank scores (one score for each readability test). A treatment like this has the great merit of clarity: it reduces four disparate sets of results to the single orderly table shown as Table 1.

Table 1. Abstract readability results Combined readability rankings

Databases – ranked in order of readability	Type of resource
Lycos Top 5% *(best)*	Internet subject tree
Infoseek	Internet subject tree
Excite	Internet subject tree
Yahoo!	Internet subject tree
Magellan	Internet subject tree
WebCrawler	Internet subject tree
ADAM	Internet subject gateway
OMNI	Internet subject gateway
SOSIG	Internet subject gateway
Euroferret	Internet subject tree
NetFirst	Internet subject gateway
LISA	Print/online database
ERIC	Print/online database
ISI	Print/online database
EEVL *(worst)*	Internet subject gateway

The table shows very clearly that the Internet subject trees are outstanding in this respect, the print-sourced databases are noticeably weak, and the Internet subject gateways have intermediate scores. Such a table is informative, but it can be combined with other measurements to make it into a more powerful analytical tool.

Table 2 is an example of this, showing the databases in their ranked order, accompanied by figures for abstract length. The result is far more interesting and informative than a display of either factor on its own. It shows that the two sets of data for readability and abstract length can be made to tell a collective story, but it also shows that abstract length is not the whole of the story.

With the notable exceptions of the most readable database (Lycos Top 5%) and the longest abstracts (ISI) the story emerging from this table is of a correlation between higher readability and shorter abstracts. Similar tables were compiled for word length and sentence length. Interestingly, some of the longest sentences were found among both the least readable and the most readable abstracts, while words in the most readable abstracts tend to average about half a character (a large amount) shorter than in the least readable. However, it is possible that the abstracts with the shortest words (all but one from the seven Internet subject trees) are influenced by the generalised and 'easier' nature of their source material.

Table 2: Combined readability ranking and abstract lengths (in words)

Databases – ranked in order of readability	Abstract length	Type of resource
Lycos Top 5% *(best)*	118	Internet subject tree
Infoseek	31	Internet subject tree
Excite	46	Internet subject tree
Yahoo!	17	Internet subject tree
Magellan	53	Internet subject tree
WebCrawler	45	Internet subject tree
ADAM	66	Internet subject gateway
OMNI	58	Internet subject gateway
SOSIG	58	Internet subject gateway
Euroferret	32	Internet subject tree
NetFirst	60	Internet subject gateway
LISA	92	Print/online database
ERIC	51	Print/online database
ISI	136	Print/online database
EEVL *(worst)*	69	Internet subject gateway

There seems little to choose between *sets of results* produced by the Flesch Reading Ease, Flesch-Kincaid, and Bormuth tests. All these tests agreed in the broad ranking of abstracts, though all showed some disagreements too. In particular, the Coleman test results were subject to variations that suggest they be used with some caution.

So far as the more immediate questions relating to abstract features are concerned, the readability tests showed a remarkably consistent clustering of test results into three groups (print derived, general Internet subject trees and subject gateways) suggesting that abstracts from these sources are conforming to guidelines recognised by their creators, though not generally published. But there is scant evidence suggesting that readability scores can be firmly linked to any of the factors that users would acknowledge as relevant to their usage of abstracts. Readability scores are a mechanical assessment of text's basic properties; they are not a substitute for users' opinions. For instance, EEVL, one of the UK gateways, is consistently at the foot of the readability tables, but project workers made more favourable comments on EEVL than any other database examined!

Abstract Content

The project wished to delineate the accessible components of the database abstracts. In this context 'accessible' meant not only points of information easily available to ordinary users but also those components that could be assessed easily by the project's student workers. Thus any matters likely to need unusual technical understanding or subject expertise were not investigated.

Conceptually, testing for this was a simple matter. Five 'main points' were selected from a source article, and its abstract examined for mention of the points. Scoring this measure for presentation was complicated by the facts that the sample size for each database varied slightly (because of idiosyncrasies of collection and the later removal of anomalous records as part of the data cleaning exercise), and not all source articles possessed five main points. The scoring system adopted was to convert the 'yes' scores (meaning concepts present in the source were also found in the abstract) to a percentage, and simply to add the percentages to generate a crude number. To allow easier comparisons, the scores were normalised to present the maximum score as 1.00. Table 3 shows the success of each database in discovering and representing source article concepts in its abstracts in parallel with the median abstract lengths.

It could be argued that this table shows the extent to which each database's abstractors and the project's workers concurred with each other. The counter argument is that, with one exception (at the middle of the table), each of the sets of abstracts used to compile the scores was the product of several different project workers, and this reduced the opportunity for results to be clouded by personal idiosyncrasies.

Data in this table are normalised with respect to the best performing database, ADAM, which project workers found had reported 64% of the concepts they identified in its source items.

Interpretation of the table needs careful thought, and a reminder that several layers of information are hidden behind the figures in the column headed *Representation of source article's concepts*. Overall, project workers found about 36 per cent of their source item concepts were present in the abstracts.

The best-supported interpretation of the table seems to be that databases with the largest abstracts are the most likely to include a source item's significant points. Additionally, the free Internet gateways and print-sourced databases (all with longer abstracts) are markedly more successful at making good use of their words, whereas the Internet subject trees (with their smaller number of words and entertaining language) report disproportionately fewer concepts.

Abstract Style

Abstracts were originally devised for a world of paper documents, when the abstractor could be sure that the document abstracted was identical to the one seen by users. In the networked environment the document seen by the abstractor may be updated after the abstract is written. More problematically, the user's navigation of hypertext documents can ignore the parts highlighted by the abstract, and the user may experience a document quite different from the abstractor. Worse than this for the likely relevance of the abstract is the case of a gateway's abstracts, frequently representing *collections* of docu-

Table 3. Representation of source item's concepts and abstract length

Database	Representation of source article's concepts	Abstract length (in words)	Type of resource
ADAM	1.00 *(best)*	66	Internet subject gateway
OMNI	0.79	58	Internet subject gateway
ISI	0.75	136	Print/online database
NetFirst	0.73	60	Internet subject gateway
EEVL	0.71	69	Internet subject gateway
ERIC	0.71	51	Print/online database
LISA	0.71	92	Print/online database
Lycos Top 5%	0.52	118	Internet subject tree
WebCrawler	0.44	45	Internet subject tree
Euroferret	0.41	32	Internet subject tree
SOSIG	0.40	58	Internet subject gateway
Magellan	0.40	53	Internet subject tree
Excite	0.28	46	Internet subject tree
Yahoo	0.26	17	Internet subject tree
Infoseek	0.21 *(worst)*	31	Internet subject tree

Data in this table are normalised with respect to the best performing database, ADAM, which project workers found had reported 6% of the concepts they identified in its source items.

ments. Collections may change, and may be experienced in different ways by different users, and each collection can point onward to more documents. In the electronic world our conception of abstracts needs a richer taxonomy that the traditional taxonomy of only four categories (Borko and Bernier[14] [p13-20] described additional special categories). The categories are usually interpreted as:

- Informative abstracts: provides important quantitative and qualitative information from the source items, and are sometimes able to act as substitutes for the sources.
- Indicative abstracts: describe and characterise the source item; this type of abstract is adapted to dealing with multi-topic items.
- Reviewing abstracts: summarise items and makes appropriate critical assessment of their character and content.
- Critical abstracts: analyse items and show the reader whether they are significant and worth pursuing, but do not attempt to comprehensively represent the items.
- Mixed abstracts: contain significant elements of two or more of the above.

With inevitable reservations about the niceties of boundaries between one style and another, abstracts were analysed to determine their style, and the mixed style abstracts were analysed into their components. Merging all this stylistic data allows the overall distribution of styles across all the databases to be revealed, in Table 4.

Table 4. Distribution of basic abstract styles

Abstracting styles	**Incidence (%)**
Informative	50
Indicative	30
Reviewing	19
Critical	1

The overwhelming prevalence of informative and indicative styles is very apparent. The data on abstract styles can also be examined from the perspective of the individual databases, but only in respect of the informative and indicative styles, as there is insufficient data for a wider examination.

The percentages shown here have been calculated from all the decisions made about abstract style, and have been normalised to allow for differences in sample size.

The percentages shown here have been calculated from all the decisions made about abstract style, and have been normalised to allow for differences in sample size.

The two tables should be seen as complementary, if not reciprocal. Informative style is used more

Table 5. Use of the informative style by abstracts

Database	Abstracts using an informative style %	Type of resource
Magellan	97	Internet subject tree
Lycos Top 5%	76	Internet subject tree
LISA	73	Print/online database
ADAM	72	Internet subject gateway
Euroferret	70	Internet subject tree
Infoseek	70	Internet subject tree
ERIC	67	Print/online database
OMNI	65	Internet subject gateway
WebCrawler	61	Internet subject tree
ISI	60	Print/online database
EEVL	55	Internet subject gateway
Excite	45	Internet subject tree
NetFirst	35	Internet subject gateway
Yahoo	33	Internet subject tree
SOSIG	30	Internet subject gateway

The percentages shown here have been calculated from all the decisions made about abstract style, and have been normalised to allow for differences in sample size.

Table 6. Use of the indicative style by abstracts

Database	Abstracts using an indicative style %	Type of resource
OMNI	100	Internet subject gateway
EEVL	77	Internet subject gateway
ERIC	66	Print/online database
SOSIG	61	Internet subject gateway
NetFirst	49	Internet subject gateway
Excite	48	Internet subject tree
Yahoo	40	Internet subject tree
ISI	37	Print/online database
Infoseek	30	Internet subject tree
WebCrawler	24	Internet subject tree
Lycos Top 5%	15	Internet subject tree
ADAM	13	Internet subject gateway
LISA	3	Print/online database
Euroferret	0	Internet subject tree
Magellan	0	Internet subject tree

The percentages shown here have been calculated from all the decisions made about abstract style, and have been normalised to allow for differences in sample size.

widely by all three kinds of database (print-sourced, gateway, and Internet subject tree), but the indicative style is clearly favoured by the gateways – except for ADAM. Inspection of ADAM's abstracts suggests the reason for this may be the obvious one, a significant effort is made to put factual information into the abstract, rather than adopt the looser terminology of an indicative style. The preference of Internet gateways for the indicative style is most probably a consequence of the nature of their source material, which are commonly collections of documents rather than individual documents.

Conclusions

The study found consistent but imprecisely defined differences between abstracts drawn from the three types of database. Those from print-sourced databases were the longest, but scored poorly in readability tests while by far the shortest and most readable abstracts were those from the Internet subject trees, and abstracts from the Internet gateways tended to hold intermediate positions. Internet gateways provided the most informative abstracts, closely followed by the print-sourced databases, whilst the shorter abstracts found in subject trees suffered the penalty of their brevity. Not surprisingly, abstracts from all sources made good use of their source item's title and first paragraph information, but the coverage of enriching features such as bibliographies, figures, and tables was disappointingly low.

Abstracts for the Internet subject trees and gateways cannot be seen as simply extensions of the older print derived abstracts found in databases such as ERIC and LISA. On average, the new resources have abstracts of about 50 words long (most abstracts from LISA and ISI are considerably more than 100 words, though ERIC's average 51 words), and their sentences and words are shorter than those in the print-sourced online databases. How far these differences affect the value of abstracts for real users and their needs is something that must be discovered by further research.

It is also worth noting that the explosive growth of electronic resources means that there are many more users of such resources, and that a majority of them are not information workers or skilled researchers; in fact, such is the success of the Internet that many users may be children. Existing abstracts pay very little heed to unskilled or naive users' problems. These users rarely have the evaluative skills needed to enable them to sort good resources from poor resources. For these people, it is increasingly the task of abstracts – particularly those at Internet gateways and subject trees – to guide them in resource discovery.

The authors also see a philosophical distinction between abstracts such as those found in ERIC or LISA and the new abstracts found in Internet subject trees and gateways. While the former largely fulfil a *filtering out* rôle in which users scan through the abstracts in a broadly appropriate answer set in order to reduce it to the ideal records, the latter are more active in the area of information discovery or *filtering in*. This resource classification or descriptor rôle may to some extent be subsumed by use of metadata (as in the Dublin Core and Warwick Framework) but, at this stage, it seems that the distinction is useful and may play some part in defining the variations between the two broad groups. Because of their origins and purpose, the eLib products (OMNI, SOSIG, ADAM and EEVL) probably fall midway between the two extremes. That is to say, because of their highly selective 'acquisition' of resources much of the filtering *out* is pre-coordinate and its purpose is to bring together (or filter *in*) highly subject-relevant resources. Confronted with relatively small answer sets, users may be likely to use the abstracts to both filter *in* and filter *out*.

The lack of formally fielded information in HTML documents, and thus in sources such as AltaVista, Yahoo, Excite, etc. is significant. The inability to search by data elements is important as it leads to the consideration of the purpose, parameters and limits of an abstract for the Internet. In this medium, if not in conventional databases, there may be a need to move beyond the established ANSI model of an abstract. An ideal 'Internet abstract' might include, for example, user guidance, assessment of authority, discussion of physical attributes (the design of the site or the ease of navigation), judgements on quality, or pointers to alternative sources. It is an open question as to whether extensions such as there are appropriate for an abstract; the additional complexity may outweigh any advantages and an alternative approach to these problems may be possible within the area of metadata. Abstract-like functions and filtering information could be attached to resources as metadata. The attraction of this approach lies in the possibility that other metadata elements could establish the provenance and date of the abstract while, as has been suggested by the Centre for Information Quality Management (CIQM), still others could contain qualitative and evaluative information.[15] Developments in metadata, most notably surrounding the Dublin Core, Warwick Framework[16], Resource Description Framework (formerly PICS) and the London Quality Core (LQC) proposed at a recent CIQM/LA meeting, may be the most satisfactory way to achieve this recognition. Complementing many of these mechanisms for resource description, the draft of a new Web markup language, XML, offers yet another avenue for implementing such descriptive information as document creators care to make available[17].

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16. Frequently updated details of the Resource Description Framework's progress can be found at http://www.w3.org/

17. The draft is scheduled for publication in December, 1997. Details will be published at http://www.w3.org/

The Internet: it's early days, but there are some surprises

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Abstract

The Internet looks set to have a major influence on information seeking behavior, although there is very little hard data around as to what these changes will be or where they will occur. This British Library funded study set out to gather such data from the media using open-ended interview techniques. Several hundred journalists, editors and media librarians were interviewed. The early findings indicate that the Internet is not impacting in the way forcasted. Change appears to be slow and variable; the issues of information overload and the authority of Web data seem not to worry users; and there is little evidence that other information sources are being significantly displaced because of Internet use. However, it is still too early to determine the full impact of the Internet although it is best judged away from the Information Centre/Library.

Introduction

The research brief was straightforward, but possibly ambitious: we sought to discover whether the Internet represented the big bang, a paradigm shift for the information world. Why bother asking in the first place, for surely you do not need research to tell you what is clearly obvious? Patently an invasion of millions of end-users – many of them novices – into the online environment in the space of a few years is bound to be highly disruptive – and most of all to those already working in the field (information professionals). Maybe so, but most of what we know is anecdotal, supposition, and (professional) wish fulfilment. Information professionals tend to be more interested in the technical opportunities that the Internet brings with it, happy, for instance, to argue about the merits of push and pull technology. It would appear that information edifices and philosophies are being fast-built on hot air, hype and wishful thinking. There are plainly big dangers in that.

What is lacking is hard data on what is *actually* happening on the ground. The project[1] set out to gather this data and started by looking in the place where it was thought that the bang might be the loudest; where any shift would be of warp-drive dimensions. That way those not in the vanguard could be alerted to the good or bad news. Where better to start than the media. As information providers with much at stake and doubly hit – not only are their information seeking practices under attack but their very industry is also threatened by the migration of news dissemination on the Web – surely they would be in the front-line. Or so we thought. Read on.

Collecting the data

Interviews were held with hundreds of editors, journalists and media librarians. Open-ended interviews were the chosen research instrument because of the complexity of the Internet (people refer to it by various labels, see it in different lights), its relative newness, its huge *potential* as an agent for widespread and fundamental change, and the fact that we wanted to avoid feeding people with our views and then receive back a recycled version of them (a feature of a good deal of research these quantitative days).

The wonderful thing about the Internet is that everyone wants to talk about it. By judicious (and crafty) questioning it is possible to explore a whole range of information phenomena that were once thought to be out of bounds in discussions with end-users. The Internet is the information equivalent of the *Trojan horse*. The opportunities for a comprehensive investigation of the entire communication system are there and must be grasped.

What we heard from our 200 or so interviewees – representing newspapers, new media companies and broadcasting organisations from around the country – was not quite what we had been lead to expect from the published literature and latest conference utterings. A lot of it was commonsense – something, in retrospect, sorely lacking from the literature. Information professionals – the sort that pontificate that is – were generally wide of the mark.

Findings

We felt that we needed to get quickly to the heart of the matter so we posed some very direct and pertinent questions. These questions, together with the answers received, are given below:

Q1. *Does the Internet herald the dawn of a new information age or have we been here before, with on-line services, CD-ROM, and Prestel/Ceefax and the telephone before that?*
Answer:
No it doesn't – though a ray of sunshine the Internet may be. Most journalists do not use or even have access to the Internet, or, indeed, worry about this fact. They live in an information-rich environment so why should they? The minority who use the Net have eased it into their existing information arrangements.

But it does depend on who you ask – if you ask the New media lab journalists (those who publish on the Net) they say it is already impacting heavily – and they do appear to live online to the exclusion of all else. Possibly, the information package you produce is bound to be your preferred information source. Take the (continued) popularity of cuttings with the traditional print journalist, for instance.

Q2. *If not everyone, and not now, then are we looking to the future and the young and computer literate for the big changes?*
Answer:
The evidence doesn't support this. Far from Internet users being the stereotypical young (and male), most are well practised journalists, well into their middle age, and in some media companies women outnumber men. 'Oldline' hands figure strongly amongst active Internet users. Most Internet users are accomplished users of all the available sources and systems – heavy Internet users are simply heavy information users, full stop. No signs of information system leapfrogging here, except maybe in the case of freelancers (now they are typically young, but it is not age that determines their use of the Net).

Q3. *What happens when an accessible, comprehensive, powerful and freely available computerised information system is placed on the desks of end-users?*
Answer:
From what we have just said, not a lot. Systems are never as accessible as you think – in fact they are not even on the desk in most cases. And many users have been there before with FT PROFILE, internal databases etc. End-users are also either oblivious or blasé about Internet search facilities – search engines, spiders and the like.

Q4. *With end-use jumping off the scale what does this mean for the intermediary – no jobs or a new role?*
Answer:
Well, in the first place it isn't – certainly not in the office anyway. More journalists search internal databases than the Internet. In fact it is the intermediaries that are making the running and using the interest in the Net to get involved in end-user training, support and research (seizing the opportunity The Guardian Library has changed its name to Research and Information Unit). Probably earlier waves of technology have had a bigger impact – the maintenance of internal databases has confined some information professionals to a largely backroom role.

Q5. *How will end-users handle the problem of information overload that the Internet brings with it?*
Answer:
Most of them are not concerned one bit. They are used to wrestling with piles of information, juggling with the phone etc. They just try to avoid it. Actually, users are bored to death with questions about information overload. As the following quotes testify: 'There is always a lot of griping and whingeing going on when anybody introduces anything new. When they introduced Reuters in the nineteenth century people said they couldn't cope then'. 'If you put a search phrase into a search engine and it is not specific enough you get overload, but whose fault is that?' 'Your average journalist reads four or five national papers every day (and six or seven magazines a week'. Any one of the Sunday papers contains enough words to to provide almost the entire text of Dickens... we listen to the Today programme and The World Tonight and watch News night on TV... you throw in the Web, that's nothing

Q6. *Will quality and authority of the data source now take a back seat in the desperate hunt for more information delivered more quickly?*
Answer:
Not really, most journalists are deft at spotting the good from the bad. Anyway, they either search the Net to find out some official information from an official site – in which case there is no problem – or they are actually looking for dirt, the controversial etc. – in which case the suspect quality of the Net is an asset. Another 'yawn' topic: as one journalist said 'you just apply the normal rules of common sense'.

Q7. *Does the Internet have the power to change information seeking behaviour, and, consequently, working practices?*
Answer:
In information seeking terms, not yet, if ever; and not for most journalists anyway. All-conquering Email has hardly touched this world. A little more searching from home, maybe. Although, as we have already mentioned, in the cases of a few IT and the New Media lab journalists, it has taken over. They believe that the Net will expose lazy, poor journalism which is all around them. 'You can't get away with all that with information being so widely available on the Net'. Even in the case of the more traditional journalist surely deadlines will have to change?

Q8. *Will the Internet displace existing hard-copy, on-line and CD-ROM services?*
Answer:
Highly unlikely; and almost certainly not. No other communication medium or information system seems to have greatly lost out to the World Wide Web. If that had happened that might have explained why nobody was complaining about information overload: they simply picked up one source and dropped another. More often than not the Internet both reduces and increases the use of a source leaving usage levels at what they were but having slightly changed the nature of use. The use of the telephone is a good example of this. The phone is used less to contact the press office of a company for a copy of a press release or annual report; instead they visit the company's home page and download the document. In this case the Internet has resulted in a decline in phone

calls. However, the Internet can also boost phone use. The alleged suspect quality of information on the Internet has journalists cross checking this information over the phone. What seems to have changed is when the telephone is used: instead of phoning first they now phone after they have gleaned some information from the Internet. Similar things have happened to online/oldline: media librarians tell us that their individual online bills are falling, and online hosts tell us that more people are coming into the market, having been enticed there by contact with the Internet.

Q9. *So, if journalists are not concerned with overload, quality, response times what are they concerned with?*
Answer:
Quite a few things in fact

- **The unlimiting and unremitting nature of the World Wide Web:** 'with the Internet you could go on and on never reaching the end – with a book you know you have come to the end of the chapter; with the Internet you cannot see what is before, what is after, how much there is to go'.
- **The anonymity and uniformity of much Web information.** A journalist made the comparison with cuttings: pointing to a pile on her desk she said – look at these: from just scanning them the size, fonts, formats etc. I know what kind of story they are without me having to read them. I know the tabloids from the broadsheets, the popular article from the specialist one and the short from the long. On the Internet it all looks the same.
- **The potential for the 'dumbing' down of the information process – surfing rather than searching.** We were often regaled with stories illustrating that more information, more current information, more speedily provided information did not equal more understanding or enlightenment. There were real fears of a generation fed 24 hours a day with information from a vast array of channels but ending up with information malnutrition because they could not digest all of it. We were told that the increased speed with which people had to respond because of the advances in computerised editorial production. This combined with the extra weight of information generated by computerised information systems meant that they couldn't research as exhaustively or confidently as they once did, and that they were more inclined to knee-jerk reactions. As one journalist told us: 'In the old days I used to pride myself with the fact that I read every cutting on a topic so I knew everything and did not repeat anything. And it is possible to 'read' a hundred or so cuttings at one go. Its so easy to discount things with cuttings. With online or the Net you cannot physically look at every story – there are too many and it takes too long. Today I am content to look at the first few displayed'.
- **The future of the newspaper when hard-copy news reporting migrates to the Web? More dumbing down?** The currency – the live broadcasting, and the tailor-making qualities of the Net would ensure the migration; leaving newspapers with just the features. 'The introduction of WebTV will have the ironic effect of making people less informed about the world despite the wealth of information accessible from their TV terminal. This is because they are not going to use the Internet to read news. However, WebTV will change newspapers – they will go further down the road of providing features, consumer issues etc rather than hard news. Result – people will be less informed by newspapers and will ignore (or skim) news on the Web'.

Conclusions

Plainly it is early days in the life of the Internet and even amongst the industries and professions in the vanguard of change there are still adjustments to be made and changes in the pipeline. But a lot of things are already clear:

- even in the case of this information mammoth, change is slow, uneven and relatively gentle – even amongst those in the front-line;
- things in the information world have in fact been changing for sometime – and most people are still adapting to/embracing the previous round of change (or even the one before that). There is some evidence that the information professional, with their eye on the goalpost (currently The Internet) and not the ball (always the user) will arrive in the penalty area without the ball;
- taking the football analogy even further, it is best to get high on the terraces – and out of the executive box (the Information centre/library) – so that you can see the big picture unfolding – it looks/ feels quite different there – and you get some big surprises (like we did).

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Lyotard and postmodern knowledge

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Abstract

Lyotard's work on postmodern knowledge has been influential on our thinking of paradigms, meta-narratives, legitimation, and contemporary trends in the information economy. These issues are discussed, criticisms of his work examined, and implications for information professionals explored.

The ways in which knowledge operates in the community attract persistent attention. We have seen in recent years how value and impact studies have increased in importance. Lying both behind and above these, however, are the many challenges associated with trying to understand how knowledge is created in the first place, why it changes, and how it becomes the sort of knowledge about which influential researchers and practitioners agree. This is a wider debate, taking in many disciplines other than information as such, or, putting it another way, it is a debate the pluralism of which serves to prove the multi-paradigmacy of information studies in its own right.

This article aims to discuss some of these issues with particular reference to the influential French writer, philosopher and linguistician, Jean-Francois Lyotard. It sets out some of his major ideas about knowledge and considers the ways in which these have provoked responses. It is a debate which is still going on, shedding light on critical issues of meaning, consensus and legitimation, and, despite its first appearance of artificiality, has a close bearing upon the ways in which we understand the ways in which knowledge is formed, disseminated, and received (ie the sociology of knowledge). A study of Lyotard also takes us into postmodern territory, one where information sits side by side with culture and ideology, reminding us of how converged information is with other strands of existential experience.

Lyotard and meta-narratives

Jean-Francois Lyotard was botn in 1924 at Versailles. After teaching in a school, he became a lecturer and then a philosophy professor at the University of Paris, a post he held until he retired in 1989. He served on the editorial committee of the socialist journal *Socialisme ou barbarie* from 1956 to 1966, and was an active opponent of the French government over the Algerian war. He took an active part in the social upheavals in France in 1968. He was a prolific writer in many areas, although he is best known for two works, *The postmodern condition : a report on knowledge* (published in French in 1979 and translated into English in 1984) and *The differend : phrases in dispute* (published in French in 1983 and translated into English in 1986). He is without doubt one of the most influential writers in his field, for what he said about information patterns in society, and for provoking much discussion in recent years.

For information professionals, *The postmodern condition* is probably the most relevant and interesting. It was originally written as a report on knowledge for the government of Quebec in Canada. It examined knowledge, science and technology in advanced capitalist countries, picking up the important links between information and scientific, economic and social change which characterises the postmodern, post-industrial world, the 'global information economy'. Lyotard suggests that the very notion of society, in terms of national identity, is losing credibility in this pluralistic, global marketplace. Historical conceptions of society as an organic whole are obsolescent : Durkheim regarded society as an organic whole, Parsons as a functional system, and Marx as a divided whole with two oppositional groups or classes. All such representations of society get thrown away, Lyotard argues, in a postmodern information world.

One major reason for this is that there has been a fundamental shift in the way in which knowledge is legitimated. There is growing disbelief in what might be called the 'big picture' view of reality. Big pictures are associated with large systems of knowledge and thought, like Christianity and Marxism, systems with reference to which, and by means of which, scholars and researchers and professional people define meaning, evaluate valid knowledge and research methodologies, and determine truth. One name for these big pictures is 'paradigm', a word suggesting coherent and commonly shared systems of knowledge and ideology, such as the contemporary view of biological evolution. Paradigms exist in general (like a scientific view of the universe with the Sun at the centre of our part of it) and in particular domains (eg determining accepted ways of knowing and investigating things, setting boundaries to what should be known by a professional peer group). An example in psychology would be what is 'best' known and regarded as researchable, setting boundaries perhaps beyond which para-psychology might lie.

Disciplines like medicine, law, and information studies may be said to have paradigmatic characteristics. Information studies, like education, is a particularly complex one in having several interlocking paradigms drawn from its other constituent disciplines (which are, of course, independent disciplines too) – sociology, psychology, economics, semantics, computer science, management. Paradigms are larger and wider than disciplines. They are systems of thought and belief with reference to which we understand the nature of known and knowable knowledge and investigation.

Lyotard refers to these big pictures as 'meta-narratives'. Examples of meta-narratives are that every society exists for the good of its members, the whole unifies the various parts, and relation between the parts is just or unjust dependant upon the circumstances. They are narratives in the sense that they serve, or claim to serve, as comprehensive frameworks for knowing and assuming in all other spheres of intellectual activity, from science to magic. They are 'meta' narratives (ie 'beyond narrative') owing to the fact that, in turning to them and using them, we know them and we know we know them, we are continually reminding ourselves that they form part of the way in which we know and come to know more.

Lyotard links this with the condition of postmodernity. This is the general condition of contemporary Western civilization where great meta-narratives and traditional paradigms no longer work. For instance, we live in a post-Christian (ie multi-faith, no faith) society. For instance, we live in a society where modernist assumptions (say about artistic, architectural, and musical design) have been overturned by pastiche, irony, and bricolage. The meta-narratives (big picture explanations, some call them 'grand narratives') have also been historically displaced, because in postmodernism history itself, and the continuities and causalities it implies, have allegedly been abandoned : so it is, for instance, that the Enlightenment story of the steady progress of reason and freedom, the dialectic of spirit in Hegel coming to know itself, and Marx's forward march of human productive capacity emerging out of and through class conflict and revolution are all displaced. The argument is not that of history but that of *a*history. A good example is the way, through feminist criticism, the meta-narrative of paternalistic discourse and history has been questioned, reformulated and replaced by a gender-free paradigm.

For Lyotard these meta-narratives represent a particularised 'modern' approach to the process of legitimation. Legitimation is what happens when we ask what makes things true – eg what makes political decisions or literary judgements true, what meanings and assumptions operate to reinforce this attribution of truth, and what social structures (eg powerful state or corporate interests) exist to underwrite and promote these forms of legitimation. The process of legitimation turns what is warrantably true into what communities of experts and practitioners regard as 'what is', and this sets up many important social sanctions and filters (eg what editors accept for publication in learned journals, what gets through peer-review). Legitimation presents us with the epistemological dimension of the knowledge flow and exchange.

As Fraser and Nicholson (Nicholson, 1990) suggest, each meta-narrative situates first-order discursive practices of inquiry and politics within a broader totalizing meta-discourse which legitimates them. First-order discursive practices (eg the forms of meaning and communication devised, say, by a specialist group like communication researchers) are, then, set within the wider framework of discourse, which not only is used and sanctioned by the larger society (of scholars, academic, professionals, the general informed public) but which is knowingly accepted as a form of legitimate inquiry and self-conscious practice (the concept of the reflective practitioner), making is a meta-discourse. Talk these days of metadata reflects the same meta-cognitive acceptance that there are data and data about data, and, in the same way, discourse and discourse about discourse. Of course, meta-discourse operates at the second-order, and, without it, intellectual communities would deprive themselves of important techniques of self-scrutiny and evaluation.

The meta-discourse narrates a story about the whole of human history which purports to guarantee that the pragmatics of the modern sciences and modern political processes are themselves legitimate. These pragmatics, Fraser and Nicholson suggest, include the norms and rules which govern these practices, determining what counts as a warranted move within them (eg that the political process allows for the fair and democratic expression of pluralist views). The 'story' serves to guarantee that some sciences and some politics have the right pragmatics and so are the right practices. We see this in Thomas Kuhn's study of *The structure of scientific revolutions* (Kuhn, 1970) where he argues for the legitimising effect of particular systems of thought (ie scientific paradigms) on the creation and dissemination of knowledge.

Such meta-narratives have a strong effect on what is regarded as true and just. They are privileged forms of discourse capable of situating, characterising and evaluating all other discourses. Lyotard found them merely modern and depasse. He claimed that we could no longer believe in the availability of a privileged meta-discourse capable of capturing once and for all the truth of every first-order discourse. Their claim to being 'meta', he argued, simply did not stand up : they were merely one discourse among all the others. Because of this, then, legitimation, both epistemological and political, could no longer exist in such meta-narratives, in a postmodern environment. In such a world, legitimation becomes pluralistic, localised rather than generalised, and immanent (ie inherently in particular situations or cirumstances, like the discourse of a particular group or locality).

There are many discourses of legitimation, and these are dispersed among the plurality of first-order discursive practices that exist today. For instance, scientists no longer turn to prescriptive philosophies of science to underwrite their procedures, but rather they themselves problematise, modify, and warrant the constitutive norms of their own practice even as they engage in it. Instead of hovering above practice, legitimation descends to the level of practice itself, and becomes immanent in it. That is to say, practitioners assume responsibility for legitimising their own practice. Another example lies in the political domain : we cannot have nor do we need a single over-arching theory of justice : a 'good society' can operate with a decentralised plurality of democratic self-managing groups and institutions whose members problematise the norms of their practice and take responsibility for modifying them as situations require. We can see this in the work going on currently in the information field into intellectual property in the electronic domain, and into professional ethics.

Lyotard is suspicious of the big picture approach in historical and social narrative too. Here his main target is Marxism. He claims that it is too big, covering virtually the entirety of human history, too theoretical since it is dependent on theories of social practice and social relations which claim to explain historical change and development. He suggests that such an approach serves to obscure the diversity and plurality of human practices and contemporary social and cultural differences. He argues that a postmodern conception of sociality and social identity, a conception which he calls 'a social bond', should replace such a big picture view. What holds society together is not a common consciousness or institutional substructure, but a weave of criss-crossing threads of discursive practices. No single one dominates, or runs throughout the whole weave. Often discursive practices (eg the ways in which people are defining particular phenomena or processes in intellectually convincing and coherent ways, like Cronin's application of value-chains to information organisations, Boisot's analysis of the information space, Orna's work on information flow) hinge in influential and/or creative individuals or nuclear groups (eg the De Montfort group working on the electronic library, Aitchison's work on wordwebs). It follows that social identities are complex and heterogeneous, and that there is no social totality as such, and no possibility – or desirability – of turning to a totalising social theory which says there is.

This work has served to unsettle many traditional assumptions about knowledge and information. For instance, Lyotard argues that postmodern society tends to emphasise 'rationality', above all in organisational decision making. He terms this 'performativity', the tendency to universalise instrumental reason, to subject all discursive practices to the single criterion of efficiency or performativity. Information professionals engaged, as most of us are, in performance evaluation and quality assurance, will recognise the effect of these processes on the workplace, and the impact such processes have had upon the rhetoric and semantics (eg mission and Investors In People statements, performance indicators, definitions of research) of professional, first-order, discursive practices.

Lyotard's work has also provoked us to question two well-established meta-narratives : the idea that knowledge is produced for its own sake (no longer tenable in a world where knowledge is commodified and increasingly a private good) and the idea that knowledge is produced for a person/subject in search of emancipation (highly questionable in a world where, with more information flow than ever, disparities between information-rich and information-poor groups are becoming clearer, and where hegemonistic ideological and corporate structures are shaping the development of information services and access to them).

The postmodern condition

One of Lyotard's most influential works was *The postmodern condition : a report on knowledge*. In his introduction he says that the object of the study is the condition of knowledge in the most highly developed societies. Jameson would have called these countries where late capitalism is alive and well, and, since the decline of Communism, that is most of the first and second world and a fair part of the third as well. Changes have meant that the grand narratives of the past no longer apply to the postmodern world. Postmodernism is incredulous of these narratives. The status of knowledge has been altered as societies entered the post-industrial age and cultures entered the postmodern age.

Most people date postmodernism from the 1960s and 1970s, and, of course, post-industrialism (sometimes called post-Fordism) dates from the vast changes in the industrial, economic and information infrastructure of the modern state with the arrival of computerisation and global information access and provision. Traditional forms of learning and training change as new ways of creating and disseminating knowledge appear. We see this in the changing concept of the teacher and learner, the changing concept of the library (moved from holdings to access), and the exponential growth of electronic and virtual library services. Changes in intellectual property, say, as a result of 'free' dissemination of information on the Internet, are part of this structural change in information. Knowledge is 'mercantilised' in the nation-state, and, when that happens, the character of the state itself changes.

The reason for this is based on legitimation, that link between meaning and discourse and power and ideology which Foucault had so much of interest to say. The debate about legitimation challenges us to ask how we know things are true and right. It is both an epistemological and moral debate. If traditional narratives have lost credibility, and the discourse we use is itself part of a set of linguistic games (even the language we use to analyse language is implicated here, see media meta-talk and the meta-talk of organisational goal-setting), Lyotard argues that the most likely form of legitimation, above all at a time when performativity is popular (ie legitimated professionally and not merely as a fashion), will be capitalistic. So research and education are processes justified increasingly in these terms, and information provision and access, which are tightly implicated with both, is drawn in too.

Lyotard takes a characteristically sceptical postmodern approach to the rationality that underlies such performativity, and argues for the role of the 'petit recit', the 'little narrative', that of individualised discovery, the role of dissensus (he calls it parology) : he distrusts the overarching notions of consensus associated with Habermas, sharing with many other postmodern commentators a general distrust of the hand-me-down assumptive meta-narratives dating back to the Enlightenment.

The postmodern condition is a very readable work. His study of the condition of knowledge in developed societies leads him to criticise science for producing a discourse of legitimation which has invalidated other narratives. This presciently anticipates the current debate in science about the ways in which, and the validity of which, scientific research is conducted and how far it serves to confirm the notion of objective fact or that of a socially constructed reality. This has an established place in the literature of information studies, mainly for its relevance in fields like the sociology of information, above all in the pure, applied and social sciences. For Lyotard, the postmodern condition disallows any rationalistic consensus such as that proposed by Habermas.

Legitimation is clearly a central thread in his book. The general paradigm of progress as accumulative belies the conflictual relationship science has arguably always had with grand narratives, and as a set of grand narratives in its own right. Even the discursive practices used by those whose research and analysis gets incorporated into what ends up being called a paradigm or a grand narrative, and even the ways in which first-order discourses get reshaped and reinterpreted by second-order ones (eg contemporary researchers are more aware, at times, of research assessment exercise criteria than about the intrinsic validity of the research itself), it is important for us, as postmodernists, to recognise the ways in which the rules are essentially pragmatic. Postmodernism refuses to turn to bureaucracies and institutional truths for legitimation, and as such leads to the dissolution of traditional social bonds. Traditional views of the role and meaning of language get replaced by pluralistic and pragmatic views, with moves based on agonistics (ie dissensus, conflict), and there is an atomization of the social into flexible networks of language games quite different from the consensually socially constructed realities of organisations. Given this, we can see how Lyotard's argument for 'little narratives' and pluralism, and the increasing appearance of dominant corporate and global agendas in the information world, seem to pull in contrary directions. It is for this reason, among others, that Lyotard's work has attracted a large number of critics.

As we have seen, too, *The postmodern condition* argues that legitimation through performativity has questionable implications for society. He suggests that traditional conceptions of research (say in mathematics) have had to be reformulated since Gödel's work, which argued for a plurality of formal and axiomatic systems no one of which had sole denotative validity. Traditional conceptions of knowledge, and the paradigms within which traditional knowledge was developed, have become more pragmatic, and now research has become performative because, more than ever, it has to account to and explain itself to the state. It operates within a climate of competitive advantage and ideological power. For him true legitimation comes from a greater pluralism, more dissensus, particularly innovation and creativity : traditional paradigms cannot produce this variety for a postmodern world.

His work has attracted numerous critics. One of the most perceptive is Denzin (Denzin, 1991). Recognising that *The postmodern condition* was a controversial work in its attempt to discuss the postmodern world, interpret the cultural logic of late capitalism, examine legitimation and discursive practices, and recommend paralogy (ie dissensus). Despite the triumph of capitalism, legitimation still poses a crisis in the modern world. Science has been de-legitimised and this has accelerated its commodification, a 'force of production' in the circulation of capital. These phrases echo some of the doubts expressed by Adorno and others of the Frankfurt School about the proliferation of reproduction and the effect upon integrity in culture and society. Denzin suggests that for Lyotard the computerised, self-regulating society has won out. He places faith, however, in paralogy, the hallmark of postmodern science, with dissent and heterogeneity in the language games of science, suggesting that this works against commodification.

Lyotard had rejected the traditional approaches to society (like Marxism and functionalism), but does not go as far as Baudrillard in suggesting that the social bond has entirely dissolved into a mass of individualised atoms. Lyotard's view is that the self 'exists in a fabric of relations that is now more complex and mobile than ever before' and that these relations can be understood as a network of conflictual language games which structure the social bond. A pragmatic theory of communication and social games 'which accepts agonistics as a founding principle' provides the framework for the interpretation of these games. Denzin argues that Lyotard confuses the transmission of knowledge (information) with the rituals of the communication process which involve a huge interactive semiotic where the truth and credibility of a message are always judged 'on the spot' by a receiving agent (Denzin). Institutions become arenas for the playing out of diverse language games, in which local narratives, stories, fables, poetics, and scenarios can be performed. Such performances stretch the boundaries that institutions impose on knowledge. So communication theories based on consensus are no longer adequate.

> Speakers can never come to complete agreement on which rules are universally valid for language games, which by their very conflictual nature are heteromorphous and heterogeneous. There is no universal subject. Attempts to conceptualise societies as totalities organized in terms of either emancipation or self-regulating cybernetic principles must be regarded as projects which only produce terror. (Denzin, page 38).

For Denzin, Lyotard wants the best of both worlds : he wants to see science as both destroying and saving society, as a way of opening up knowledge and as a metaphor for the conflictual language games he refers to. The meta-narratives which Lyotard claims are gone are very much present, Denzin argues, in his work – Marxism, functionalism Big Science, positivism, cybernetics, artificial intelligence systems, Oedipal myths, catastrophe theories, and the rest. He both embraces the diversity and fludity of postmodernism AND goes back to the modernist position of wanting a clear link between language and reality, a clearly distinct position for the independent intellectual analyst of society. Denzin believes that Lyotard's neo-liberal pluralism (let each interest group and social movement have its say) begs questions about the ways in which actual institutions, and scientific communities, behave. Denzin suggests, finally, that ultimately all knowledge is narrative, framed in many different ways (institutions, culture, Western society, romance and gender, the cultural logic of late capitalism), and so ultimately Lyotard's critique is itself a meta-narrative, totalising postmodern society by 'elevating the intellectual to the central but ineffectual position of being interlocutor to a plurality of cultural differences'. No hope lies there.

Another major critique of Lyotard's work is made by Docker in his book *Postmodernism and popular culture* (Docker, 1994). Docker reminds the reader of how Lyotard's views grew out of the political events of his time, like taking part in the student revolts in France in 1968. Lyotard had been inspired by New Left ideas of anarchy and libertarianism and these helped to shape his own theories and interpretations of social change. Like Denzin, Docker wonders whether Lyotard really is a postmodern. Looking at the Appendix in *The postmodern condition*, called 'Answering the question : what is postmodernism?', Lyotard says that mainstream culture is concerned with realism, a desire for a shared communication code that will guarantee the addressee a recognisable meaning and an identity, a consciousness, that is approved by others. Mass communication as in cinema and photography is an enclosing circle connecting mass culture and its audiences : it is only mass conformisn, art debased to therapeutic uses. These are very revealing ideas, particularly if we compare those of Adorno, whose views on the effects of massification of culture and the mechanical reproduction of cultural artefacts are well known as anti-capitalist.

We gave noticed earlier how Lyotard decided not to go as far as Baudrillard in saying that society was thoroughly atomised : for Lyotard, people will always be able to retain their power and independence, while for Baudrillard distinctions between image and reality, and the power to decide about the difference, in a world of hyperreality, is very much in doubt. However, in this Appendix, Docker argues, Lyotard confidently says that all the mass audience wants is psychological reassurance, and wants to use popular culture as a kind of therapy. For Docker, this is simply updating Adorno, who argued that 'the culture industry' was established by late capitalism to produce cultural artefacts and experiences for a mass audience unable to appreciate or understand them, citing Las Vegas and other American excesses as examples of the way capitalism as a system encouraged and enabled such manipulations. Taking what Lyotard says in this Appendix, about the way in which any culture will include an avant-garde which by definition will produce work refracting the reality which most mass consumers will find too elusive, Docker finds Lyotard moving, more than anyone might have thought possible, in an authoritarian direction.

Such an avant-garde, say in film and art and photography, will be abstract, it will avoid representation and figurational approaches accessible to the mass audience (eg of a 'recognisable' landscape or portrait). Such abstraction could be seen in the work of the Dadists like the painted Duchamp, and in the allusive and complex referentiality of the novels of Joyce and Proust. On such creativity, Lyotard suggests, depends 'the fate of thought'. This argument is more one in the field of postmodern culture than postmodern information as such, particularly since it forms part of a larger debate about modernist and postmodernist cultural history, going back through Jameson and Benjamin to Adorno, and beyond to the Marxist thesis about capitalism, production, and its social and cultural effects.

At the same time, this part of the discussion sheds light on information in the postmodern world. If it is possible to argue that information, like cultural experience, can be provided for a mass audience only in an adapted, adulterated and commercialised form, then it is easy for us to understand the growth in edutainment and advertorials and other hybrids in the information and communication media, to understand the growth of commercial online services. Increasingly, debate about the production and dissemination of journalistic news suggests that popularisation is a critical and commercial factor in the existence of many types of information.

It is important to take this one step further : we should ask how much truth lies in Lyotard's contention that, with the demise of grand narratives, the force of localised and dissensual discursive practices play a crucial part in the production and dissemination of information in the modern world. We see the debate played out on the Internet where the influence of corporate power, in the form of widespread advertising and promotion by particular companies, the dominance of key players and countries and languages (eg it is very USA-centric, Netscape and Microsoft are hegemonistic players), helps to shape information, where there is the appearance of a greater diversity and heterogeneity of information given the proliferation of international companies and usergroups and others getting onto the WWW, and where the global availability of information is both celebrated as a 'fact' and questioned as a divisive factor between information rich and poor participants.

What Lyotard has to say about the demise of grand narratives, the performativity of information, the commodification of knowledge (particularly scientific knowledge), and the role of localised narratives, remains of critical interest for our understanding of these developments. At the same time, paradoxically (and Lyotard liked paradox!), there are these rather puritanical strains in the Appendix to *The postmodern condition*, applied mainly to postmodern culture admittedly, which present us with some more alarming thoughts. It is important to remind ourselves of how many so-called post-modern factors of major importance when they were first discussed (eg in the 1970s and 1980s) became acceptable commonplaces in the 1990s and may even cease to be issues of concern in the 21st century. The widespread availability of information and entertainment, and everything in between, is here in online, CD-ROM, electronic document delivery, Internet services, emailing systems, and virtual reality systems. Many areas of this diverse information world present us with the heterogeneity, irony and bricolage characteristic of postmodernism (eg the many bulletin boards, the evolving discursive practices as researchers work with joint electronic authoring systems and as cyberpunks exchange esoteric information of an arcane intertextual nature, and where convergence between various areas of the communication, information, publishing, and software industries is becoming the norm).

The concerns of the followers of the Marxist Frankfurt School, however, still have a place in this utopia, because of the dominant position of key players like Time Warner and News International, Sony and Nintendo, and because of the global commodification and distribution of information and media products and services. One writer speaks of the 'McDonaldization' of society, global homogenisation as a result of global news and entertainment services, American soaps in Norway and New Zealand, CNN and interactive electronic newspapers in Memphis and Mombasa.

There are other important social consequences which we examine in a more informed manner as a result of Lyotard's seminal work. One of the most significant in the modern world has been the changes in meta-narratives and discursive practices in the area of gender studies. We have seen Lyotard's scepticism about large historical narratives and explanatory systems (eg Marxism too big and too theoretical). We have noticed too that there is an ambiguity in his position since his rejection of social theory predicates its own theoretical perspective. His view that the social field is heterogeneous and non-totalisable and his emphasis on localised narratives in the manner of Foucault is a good way in to any examination of specific domains of social interaction and discourse such as that associated with gender studies. In an interesting paper in Nicholson (Nicholson, 1990), Benhabib takes up Lyotard's postmodernist relativism, picking out the ways in which any order of representation will incorporate public and private knowledge and beliefs and value systems, and get reflected in specific discursive practices. Both representation and discursive practice, of course, have important associations with legitimation. It is possible, however, to take pluralism too far, leading to what Benhabib calls a 'polytheism of values', from which standpoint performativity and emancipation cannot convincingly be criticised, and at the same time a kind of ambivalent postmodernism which, as Denzin said, wants it cake and wants to eat it, to deny grand narratives yet turn into one in its own right!

Feminist critics ask whether the category of gender can survive the postmodern debate. If postmodernism abandons cross-cultural differences, then what about gender differences? Could the ultimate result, in terms of semantics and denotation, be one where meanings were detached from referential realities, and where individualistic relativism turned meanings into an anarchy of dissensus ? If postmodernism is to employ deconstructionist techniques, what could be the destiny of representational techniques – of the body, of shape and location, of a cognitive place for the consciousness of characters in novels and participants in social reality ? She suggests that human interests and understanding are not heterogeneous and pluralistic, because they focus on the subject, come through the self-conscious and shaping sense of identity in the group and the nation-state. Naturally, where there is a clearly defined ideological position, as there is here, the post-modernist notion of it turning into a view from nowhere, an 'anything goes' critical standpoint, is not only an affront to traditional modernist critics but serves to undermine the distinctive case made by a distinct social group.

This is where care needs to be taken about what Lyotardian views to use and develop. His general position on postmodernism could well lead to the outcome which some feminist critics reject : postmodern, in being anything to anyone, could have that effect. On the other hand, Lyotard's emphasis on the little narratives, the paralogic or dissensual contribution to an ultimately innovative and socially supportive culture, serves to underwrite the feminist position well, as indeed it serves to underwrite other important ideological and cultural viewpoints (eg that of elderly information and communication industry consumers; that of environmental and nutritional and disability interest groups), and as such can be welcomed. Moreover, in rejecting a totalising social theory, Lyotard encourages us to re-examine the critical assumptions we have about, say, corporate power in the information industry, the marginalisation of particular groups, the undermining of national norms and values in cultures throughout the world, and the risks of cliche-isation if we use grand narratives like Marxism or Christianity in too crude a manner.

Surprisingly, there are sympathies between Lyotard and modern writers coming from an entirely different position. Miller for instance (Miller, 1995), arguing against secular culture from a Christian viewpoint, looking at modern biology and scientific knowledge, and speaks of the battle having been won by science and the dominance of positivism. At the same time, however, Miller suggests that it is importance not to ignore the way in which knowledge is a subject experience and reality, and that we come to know truth dualistically, by inspection (eg scientific experimentation) and introspection (ie subjective self-examination, phenomenological awareness). In this way, then, we come to know and understand knowledge, and, by using our subjective awareness (in his view derived from a belief in God and the values that implies), we can stand back from, and evaluate, the central myths of our time, like Darwinism, psychoanalysis, and Marxism. He calls them myths, not disparagingly, but because he wants us to realise how, over the centuries, other large narratives (eg the Creation myth, Nietzsche's death of God) have preoccupied mankind, and how many were the existential anxities which such explanations did not effectively answer. More than that, it is important to look realistically at modern science and ask whether its deterministic assumptions and effects provide us with answers or questions.

So from very different positions, like that of feminism and contemporary Christianity, we can see the discussion about knowledge, paradigms and meta-narratives, legitimation, and postmodernism, continuing. One of the most important meta-narratives for information professionals is the cognitive paradigm. This derives from links made between the human brain and computer intelligence, above all artificial intelligence. Conceptual change and Kuhn's scientific and intellectual revolutions are very much an active area of debate today (Thagard, 1992). The ways in which 'revolutions' take place involve conceptual change (eg the way the quantum theory 'replaced' Newtonian physics). Concepts are, after all, used to represent and organise knowledge and structure beliefs. Conceptual change entails changes in knowledge and belief, and also epistemological or epistemic change (dealing with what we regard as true and right).

Many of these changes arise because people seek out more robust explanations of worldly phenomena (eg the circulation of the blood, the constituency of the stars, the reasons why dinosaurs died out). Explanations may seek to confirm or test laws, and they may lead inductively to new insights and laws in their turn. Thagard cites at least four of these – in evolutionary theory, in geology and plate tectonics, in physics, and in psychology. It is in psychology, above all in developments with human and computer information storage, retrieval, and knowledge representation, that we see conceptual change of clearest relevance to information professionals. It comes through a long tradition of research into intelligence, memory, knowledge representation, and thinking and learning, by writers like Schank and Abelson, Minsky and Rumelhart. Dissensus is widespread (eg on mind/body issues, on the ability of machines to think, on virtual reality, on disintermediation so that information professionals pass on their role directly to the information user), but at the same time the institutional and administrative structures (eg prioritised research funded by key players, pragmatic consensus among editors and peer-review groups about relevance and innovation) remain firmly in place. In other words, within this paradigm or professional area, we see the very paradox highlighted in the general discussion of Lyotard's ideas earlier.

Conclusion

The work of Lyotard extends widely beyond *The postmodern condition*, particularly in the area of linguistic analysis. It is almost certainly because of this interest that he emphasises discursive practices so much in his discussion of information in the postmodern world, and, in doing so, alerts us to the importance of looking analytically and specifically at the ways in which knowledge and information get represented and discussed by practitioners, researchers and laity. More than that, his work, though in some ways very much of its time (and we now inhabit a *post*-postmodern world!) and open to criticism about double-standards and some confusion, offers a number of crucial insights about the information and communication world today, above all in terms of plurality and heterogeneity, the fall and rise of meta-narratives, how these meta-narratives are situated in and created and shaped by the scientific and economic, social and cultural context they inhabit, and how, both in large schemes as paradigms and in specific aspects like concepts and meanings, they are legitimated in complex and fascinating ways.

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and Frances Wood

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COMMUNICATIONS 98: A REVIEW PART1

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Editorial

Predictions of developments of things that will affect us deeply are always of interest. Sometimes the interest is because they are things that do not yet affect us, but we have a pretty good idea that they will, soon. There is also the frisson got from the certain knowledge that the more detailed and specific the prediction, the more surely it will turn out to be wrong.

Tony Cawkell (see page 242 of this issue) has cleverly side-stepped the predictor's trap by heading his article a review: only in the first paragraph does he let slip that he considers it a forecast. His dilemma, I suspect, is that it is impossible to review developments in any area without also opening speculation on the consequences of those developments. After all no technical development takes place without some sort of purpose in view. Tony's review of communications draws attention to two areas that should go together, but often do not. The major one (because that is where the money is going) is the drive towards an overall and meaningful increase in telecommunications bandwidth. The minor one is the consideration that should be given to what that bandwidth is to carry.

The bandwidth thrust is directed towards new kinds of communications lines, new kinds of software to drive them, and new kinds of devices to attach to the lines. It is curious that the buyers of systems should be simultaneously beguiled by advertiser's promises of what new machines can do; and be disappointed by the actual performance. Note in passing (and I have drawn attention to this elsewhere) the number of computers now sold with 56kbps modems installed. A 33kpbs modem may offer a considerable increase in speed over the tired 2400bps modem that has just gone in the bin: the difference in performance however between the new 33kbps one and the 56kbps device soon to replace it may be almost negligible. The bottleneck is the intractable problem of the installed infrastructure of the wires of the public networks over which the modem will communicate. It is exactly the same situation as a Lamborghini crawling at 5mph in a traffic jam: it *can* do 170mph, but the bandwidth is simply not there for the performance to be realised.

This discussion sits uneasily with Adeoti-Adekeye's paper on electronic networking in Nigeria. Here we have the situation that, to borrow from the analogy above, the road is still being built, and you don't try to take a low-slung super-sportscar on a rough track. The paper points out the disparity between the manifest advantages for a developing country of Internet access; and the low level of telecommunications infrastructure available. Not only is the poor inter-site connectivity hampering academic use of networks: in many cases intra-site connectivity is equally poor, or non-existent. Computers do not communicate with each other either at the technical level, or at the logical level of data and data structures. Underneath the evident frustrations lie the familiar problems of reduced (or absent) funding and a nascent national policy on telecommunications and networking.

Readers may recall Dr Doolittle's Pushmipullyu, the creature with a head at each end. Sometimes one end led, and sometimes the other. It was not always possible to know for certain which was which. In a fairly inefficient way it made reasonable progress. The push-pull of software complexity and technical complexity to run it is conspiring to make PCs obsolete within less than a year. The same effect in telecommunications means that data volumes conspire to push up data traffic capacity, and vice versa. With only just so much time available in a day, and just so much that the human brain can absorb before overload sets in, we may perhaps develop a sneaking regard for the Nigerian situation which, for all its frustration, causes those who live with it to think very carefully about what is to be communicated, and where, and in what volume. Our Western profligate use of bandwidth always pushes considerations of data quality and effectiveness in to the background.

Peter Gillman
Editor

The use and value of MSc in information studies/ information management dissertations at the University of Sheffield

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Abstract

This paper reports a study of the use and value of MSc in Information Studies/Information Management dissertations produced during the seven years, 1988-89 to 1994-95, at the Department of Information Studies in the University of Sheffield. Responses to a questionnaire that was sent to students, supervisors and external collaborating organisations showed that they all used the dissertations in various ways, as did other Departmental staff and students. Some dissertations lead to publications in the open literature, and a citation analysis showed that these publications are successful in bringing dissertation results to a wider readership.

Introduction

Postgraduate taught-course degrees are increasingly seen by students as a complement to the traditional undergraduate and postgraduate research degrees in universities. These taught-course degrees, which are normally at the MA or MSc level, are of two major types: advanced courses in which the aim is to study some particular discipline at a more specialised level than is possible at the undergraduate level, and conversion courses in which the aim is to obtain a qualification in a subject, often vocational in nature, that is different from the student's first degree. Both types of course normally involve the student undertaking a small-scale research project, the results of which are written up in a *dissertation*, which is generally comparable in form to the thesis that is the principal output of a postgraduate research degree*.

There are two obvious differences between a dissertation and a thesis: most obviously, there is a difference in scale since (in the UK) a thesis takes at least three years to complete whereas a dissertation is completed within a few months; more importantly, a thesis must present evidence of original research whereas a dissertation need not contain any truly novel material. The requirement for novelty means that theses represent a potentially important information resource, and their bibliographic control has thus received a fair amount of attention in the literature[1-6]. Far less attention has been paid to dissertations, with Sayers' work[7-8] being the only publication of which we are aware that considers the impact of dissertations in librarianship and information science (hereafter LIS). This is perhaps

[redacted]

In this paper, we report the results of a study, which was itself a dissertation, of the dissertations carried out by MSc students in the Department of Information Studies, University of Sheffield (hereafter referred to simply as "the students" and "the Department") in the academic years 1988/89-1994/95. These students were members of the one-year MSc Information Management (formerly MSc Information Studies) programmes during this period and they all completed a dissertation as part of the degree. The dissertation project is intended to benefit the student by providing the opportunity to perform a small-scale research project and thus to develop research skills that can be used in his or her subsequent career; there is no requirement to disseminate the information beyond the examiners although some in each year do result in publications in the open literature. The project discussed here sought to ascertain the value and impact of these dissertations in terms of the use made of them and of the information that they contain.

The survey

Suggestions for dissertations come from three principal sources: from the students themselves, this typically reflecting some long-standing interest or an interest they have developed during the taught course part of the programme; from the supervisors, often in association with an ongoing research project for which they are responsible; or from an external organisation that has contacted the Department, or been contacted by it. A basic questionnaire was developed to investigate the value and use made of each dissertation, and

	Number	Percentage
1 Useless	1	1
2	8	7
3	34	28
4	49	40
5 Extremely useful	30	25

Table 1. Students' perceptions of the value of the dissertation to them (N=122)

Students felt that the dissertation process had enabled them:	Number	Percentage
To gain project work experience	39	25
To gain work experience and skills	26	17
To improve research skills	23	15
To improve IT skills	20	13
To research the particular topic	16	10
To gain a job based on the dissertation or to do something relevant to the work they wanted to do	12	8
To gain analytical skills	7	4
Other	13	8

Table 2. Reasons for students' positive views of the dissertation process (N=156)

Purposes	Number	Percentage
Helped the former student in obtaining a job	14	13
Relevant in subsequent job(s)	13	12
Undertook PhD/research in similar area	13	12
Useful general knowledge gained	9	8
Gained report writing and literacy skills	7	7
Gained IT or programming skills	7	7
Useful when applying for jobs	5	5
Provided the basis for article/publications	5	5
Gained training skills	4	4
Gained online searching skills	4	4
Gained Internet skills	3	3
Gained project work skills	3	3
Dissertation was discussed in job interviews	3	3
Gained knowledge about organisations	2	2
Gained communication skills	2	2

Table 3. Purposes for which the students had used the dissertation (N=106)

	Number	Percentage
The external organisation(s) linked to project	19	34
Other external organisations/people	13	23
Departmental staff	11	20
MSc students within the department	6	11
Research group within the department	5	9
Department as a whole	2	42

Table 4. Populations which the students knew had used their dissertations (N=56)

that had had some degree of involvement with the dissertations. In addition, searches were made of Departmental records that contained details of loans of dissertations from 1992 onwards (the earlier records were not available) and of the online citation indices to identify citations to publications resulting from dissertations.

A total of 356 MSc dissertations was completed between 1988-89 and 1994-95, and a sample of just over a half of these was obtained by selecting those UK students for which full contact information (including a postcode) was available; overseas students and UK students with an incomplete address were excluded because of the difficulty of contacting them in the short time available for the project. Out of a total of 180 questionnaires sent to former MSc students 122 were completed and returned: this represents a response rate of 68%, and covers 46% of the home MSc students successfully completing the programme during the time period.

Most student dissertations are allocated to one supervisor who advises the student and is the internal marker for the completed project although a few (ten in this sample) are jointly supervised. 218 questionnaires were completed by supervisors, 83% of the total of 264 UK dissertations. Seven students and their dissertations could not be matched to a supervisor. In 111 cases, (4%), the supervisor had no recollection of the student or the dissertation, which is indicative in itself, suggesting that the thesis had little impact and no long term use. A total of 15 different supervisors, some of whom had subsequently left the Department, were responsible for dissertations, 7 of whom accounted for 76% of theses.

External organisations had some involvement with 128 of the 264 UK dissertations, in the sense that the work was commissioned by, or carried out on behalf of, an organisation: we exclude dissertations which merely utilised information from an external organisation without any supervision or feedback. Three dissertations were associated with two organisations and one was linked to three companies. A total of 85 questionnaires was sent to 45 different external organisations where the contact could be identified, and 41 completed responses were obtained. This represents a response rate of 48%, and 32% of the total number of 128 dissertations involving external organisations.

Responses from the students

Table 1 shows the responses to the scaled question of whether the students found the dissertation process a useful experience. In this table, N in the caption refers to the total number of responses and this notation is used in all the other tables; in some cases, more than one of these responses might have come from an individual respondent. The majority of replies were positive with 65% giving a score of 4 or 5, 28% feeling it was partially useful (a score of 3) and only 8% giving a score of 1 or 2. The students gave various reasons for their choices and many gave more than one response.

Those students who answered positively gave a variety of reasons for this view, as detailed in Table 2. No individual specific reason was cited by more than a quarter of the respondents, but 74% of the responses indicated skills acquisition or gaining experience as the reason for the positive value of the dissertation. Only 10% of the responses stated that the reason for the positive response was the particular topic, and even fewer indicated that the positive value of the dissertation related to its link to employment. Specific positive comments about the dissertation included:

> "I found the dissertation an extremely useful experience as it allowed me to build on my social science background."
>
> "The actual researching for the dissertation was a very useful exercise, especially evaluating the different sources."
>
> "The dissertation involved a lot of online searching in citation databases, and I also learned how to use a software package to manipulate the data."
>
> "The whole process of doing a dissertation is a useful one in that it's all about doing a piece of research and writing it up in a coherent fashion, no matter what your subject is. It is also useful in that it is part of the MSc course and that qualification is important for getting a job, particularly your first one."

The negative responses were mainly from students who had already prepared a dissertation, whilst studying for a previous postgraduate degree, and who thus felt they had not learnt anything new from repeating the process. This reason apart, other negative comments included:

> "I found the dissertation very stressful and I would not do it again."
>
> "My dissertation was too broad in scope and I myself was too ambitious, trying to pack a wide base of subject knowledge into a four month period."
>
> "It was a nightmare trying to get all my questionnaires back." "The main problem was lack of time."

Just over half of the respondents (53%) had used the dissertation or thought it had been useful to them since they graduated. Table 3 lists those reasons for use made in at least two of the responses, where it will be seen that employment figures most highly, as reflected by the comments:

> "The dissertation has proved useful in helping me to get my current job.
>
> "The experience of working for an outside company has been very useful in gaining me a number of short term contracts in commercial organisations".'

Uses mentioned by just a single student were problem analysis, interpersonal skills, information

	Number	Percentage
1 No value	61	28
2	27	12
3	32	15
4	50	23
5 Great value	48	22

Table 5. The value of the dissertation to the supervisor (N=218)

	Number	Percentage
Supervisor	100	46
Students	66	30
Others in the Department	34	16
People outside	112	51

Table 6. Populations that the supervisors knew had used dissertations (N=218)

Type of Organisation	Number	Percentage
Sheffield University department	14	11
Health research or information centre	12	9
Pharmaceutical company	10	8
Hospital or general practice	9	7
European (COMETT) project	8	6
Government agency or department	7	6
Education or training department	7	6
Information service of a company	6	5
Voluntary organisation or charity	6	5
Public library	5	4
Academic library	5	4
Museum	5	4
Other University department	3	2
Data centre	3	2
Media	3	2
Database producer	2	2
Local government	2	2
Other	17	13
Unknown	4	3

Table 7. Types of external organisations linked with the dissertations (N=128)

	External Contact		External Organisation	
	Number	Percentage	Number	Percentage
1 No value	3	7	3	7
2	4	10	7	17
3	14	34	19	46
4	12	29	9	22
5 Great value	8	20	3	7

Table 8. The value of the dissertation to the external contacts and organisations (N=41)

Type of Publication	Number	Percentage
Journal article	25	61
Conference proceedings	7	17
Departmental Occasional Publication	6	15
Other	3	7

Table 9. Types and numbers of publications arising from the dissertations (N= 41)

auditing and information analysis skills, evaluating systems and software, information presented at meetings/conferences, and publications.

Some 40% of the students were aware that that other people had made use of their dissertation or the information it contained. Six different groups of people were identified who had accessed the dissertations: as detailed in Table 4, it was mainly the external organisations linked to the projects who had made use of the dissertations. The figures reflect a wider use of the dissertation over and above its function as a small-scale research project for the benefit of the student. Not too much can be read into the actual percentages, however, as the students may not be aware of who else has made use of dissertation, e.g., they are not likely to know of other students in subsequent years consulting their dissertations in preparation for their own.

Twenty of the respondents (16%) knew that there had been publications based on their dissertations. Other outcomes from the dissertations were databases (9%), teaching packages (8%) or software packages (6%) and there was a single mention of a list of references, of a set of recommendations and of a paper-based manual. Fifteen (12%) of the participants said that work from their dissertations had been disseminated by other means, mostly conferences and meetings, although two had produced World Wide Web sites and one had published an article in a newsletter.

Responses from the supervisors

The supervisors were asked about the value to themselves of the dissertation projects they had supervised. Just under half (45%) of the dissertations supervised were considered to have been of good (scale 4) or great (scale 5) value to them; the middle scale point of 3 'of some value' was chosen for 15% of the dissertations but 40% of the dissertations were rated as either of no value (1) or of limited value (2) (see Table 5). Supervisors' comments included

> "Although some dissertations were of no value to me personally, they were of value to the students, most of whom got a job on the basis of them."

and

> "In many cases the process of supervision is valuable in itself. I have to think the project through and advise on the best methodology etc., so it is valuable in the sense of my own professional development."

The supervisors thought that most dissertations had been used by more than one person or group of people. The responses in Table 6 indicate that in the main part dissertations were used by external individuals (51%) and by the supervisors (46%) themselves, although reference was also made to use by other students (30%) and by other members of the Department (16%). The last figure is certainly an under-estimate, as demonstrated by the loan figures that are discussed later in this paper.

Responses from staff in external organisations

No less than 48% of the dissertations involved an external organisation, and the types of such organisation are summarised in Table 7. The highest proportion of these dissertations, 11%, was associated with other departments in the University of Sheffield. Because of a strong interest in health information within the Department, 9% were carried out at health information/research centres, such as Community Health Sheffield or the Help for Health Trust, while a further 7% were performed in hospitals. The pharmaceutical companies Glaxo (now Glaxo-Wellcome), Fisons (now Astra Charnwood), Pfizer and ICI (now Zeneca) Agrochemicals and Pharmaceuticals accounted for 8% of the dissertations. A further 6% of the dissertations were prepared in other European countries under the (now superseded) European Union COMETT scheme, under the auspices of which two students went to Falun Hospital in Sweden, two studied at the EC Joint Research Centre in Ispra, Italy and four did their dissertations at CITI/INETI in Portugal. Other organisations included South Yorkshire Passenger Transport Executive, the Church of England, Guinness, Sheffield Ski Village and the Royal Mail.

Table 8 summarises the responses, scaled from 1 to 5, to a question about the value of the dissertation to the external contact personally and to the organisation as a whole. About half the number of contacts (49%) felt that the dissertation had been of good (4) or great (5) value to them, whereas only 17% said that it was either of no value (1) or had limited value (2). 34% of respondents answered that it was of some value (3) to them. The value to the organisations was fairly even with the majority (46%) choosing the middle answer that it was of some value, while over a quarter of respondents (29%) said that it was either of good or great value, and another quarter (24%) said that it was of no value or had limited value to their company. A further question then asked what precise use, if any, had been made of the dissertation both by the external contact and by the organisation as a whole. 30 out of the 41 responses (73%) stated that at least some use of the dissertation had been made by the contact in the organisation, and the same percentage of dissertations was also used by the companies themselves. Examples of uses mentioned more than twice included helping to justify a department or service, to provide input to a new or improved system, to clarify a problem, to justify a resource allocation, and as a pilot project. Others were read with interest, formed the basis for a publication, provided input to a reorganisation, or provided general background information, e.g.,

> "All staff gained from discussions and interaction with the student, as it was the first of many such exercises."

and

> "It was taken on board for future reference."

Journals	Published paper (N=25)	Citing papers (N = 39 [641)
Annual Reports in Medicinal Chemistry		1
Annual Review of Information Science and Technology		3
Chemical Engineering Research and Design		1
Communications of the ACM		1
CTICM Update	1	
Education for Information		1
Information Processing and Management	1	2
International Journal of information Management	3	2
Journal of the American Chemical Society		1
Journal of the American Society for Information Science	1	10 [12]
Journal of Chemical Information and Computer Sciences	1	9 [15]
Journal of Chemometrics	1	[1]
Journal of Computer-Aided Molecular Design		[1]
Journal of Document and Text Management	1	
Journal of Documentation	2	2 [3]
Journal of Education for Librarianship and Information Science	1	
Journal of Information Science	5	[3]
Journal of librarianship and Information Science		1
Journal of Medicinal Chemistry		1
Journal of Molecular Graphics	2	[4]
Journal of Molecular Recognition		[2]
Libri		[1]
Nachrichten Fur Dokumentation		1
Online and CD-ROM Review		[1]
Online Review	2	[1]
Program	1	
Program-Automated Library and Information Systems		1
RECALL Newsletter	1	
Research, Policy and Planning	1	
Software-Practice and Experience		1
Topics in Current Chemistry		1
Topics in Health Information Management	1	[2]
Topics in Stereochemistry		
Total number of journals	16	17 [26]

[ ] = number including self-citations

Table 10. Journals in which the dissertation based papers were published and cited

	Number	Percentage
Solely Departmental	2 [10]	5 [16]
Joint Departmental and other organisations	[16]	0 [25]
Solely other organisations	37 [38]	95 [59]

[ ] = number including self-citations

Table 11. Citations of publications based on dissertations (N= 39 [64])

Country	Universities/Colleges			Industry/Commerce			Other	Total
	LIS	CS	Other	Pha	Inf	Other		
UK	3		1 [2]	1 [3]	1	[2]	3	9 [14]
USA	9	3		4	2	1	1	20
Other	2	2	4		2		1	11

[ ] = number including self-citations

Key:

LIS	Library and Information Studies Departments
CS	Computer Science Departments
Pha	Pharmaceutical Companies
Inf	Information or Computer Companies

It would appear, therefore, that dissertations were of at least some value to the majority of the external organisations and supervisors involved, indicating the quality of the projects and the confidence that organisations had in the results found. Both positive:

> "The greatest value of the work was in helping us to organise our thinking. 1 would like a student to pick up the question again three years later."
>
> "The whole project was an excellent piece of work. Although the dissertation work was much modified in the following months by the student herself, who came to work for me, it was an invaluable start."

and negative

> "The political context meant that the research would more appropriately have been undertaken by a consultant with good local knowledge and contacts."
>
> "Unfortunately the database proved to be of limited value as it was not user-friendly. The student did some excellent work in introducing us to databases."

comments were included in the responses to this part of the questionnaire, although the former were far more evident.

Various answers were given in response to a question asking whether the dissertation might be useful in a more general context, i.e., outside of the organisation with which it was carried out. The primary positive responses were that the dissertation was a good example of information usage and behaviour, or that it could be used to advise similar companies, or that it dealt with an emerging field, 7% each. Negative reasons were mainly that the dissertation was too specific (17%), or that its information quickly became outdated (15%).

Loan and citation analysis

Dissertations are available within the Department for use by staff and students, and records of these loans are available since 1992. In the four-year period 1992-96, dissertations produced by UK students between 1988/89 and 1994/95 were borrowed a total of 415 times, with all but 36 (9%) of the loans being to students. A total of 164 different dissertations was borrowed; as this figure represents 62% of all the UK dissertations produced in the period under review, it is clear that the majority of the dissertations are of subsequent use to someone. Indeed, some of them are of use to a fair number of people with one dissertation being borrowed ten times and two being borrowed nine times. These three dissertations, all of which had been suggested by external organisations, involved a study of a medical general practice, an information analysis of bed management problems at a hospital trust, and an information audit of the communication between the information service of a multi-national pharmaceutical firm and its internal customers.

Questionnaire responses identified 36 dissertations as leading to publications, 14% of the total: since some gave rise to more than one publication a total of 41 publications was produced, as shown in Table 9. The majority of the publications (61%) appeared as journal articles, published in 16 different journals as listed in Table 10; other destinations included conference proceedings, the Department's own Occasional Publications series and contributions to two British Library Research and Development Department Reports.

Citation searches were performed on all of these dissertation-based publications, using online versions of Science Citation Index (Scisearch SCI), Social Science Citation Index (Social Scisearch SSCI) and Arts and Humanities Citation Index (Arts and Humanities Search AHCI) via Knight Ridder Dialog Information Services. The search strategy that was used had the form:

E CR=(author),(year),(volume number),(first page number)? *e.g.,*

E CR= Sayers M, 199 1, v 1 7, p3 07?

The citation analysis of the resulting search outputs was performed using *residual citations,* i.e., those which remain after elimination of self-citations (citations by an author to his own work), and duplicate citations (citations that appeared in more than one of the databases). Calculations were also made including self-citations (by Departmental staff and/or the students) and these values appear in square brackets in the tables.

In total there were 39 citations in 17 journals (Table 10), from the 15 (42%) publications which had been cited at least once (Table 1 11). Of these citing papers, 37 (95%) were written by authors from other organisations alone, while Departmental staff were solely responsible for only two (5%) of them. The inclusion of self-citations revealed that there were 64 citations in 26 journals arising from the 15 publications. Now 38 (59%) of the citing papers were solely written by authors from other organisations, 10 (16%) were the responsibility of Departmental staff alone and 16 (25%) were published by members of the Department and authors from other organisations jointly.

Table 12 shows that authors from 40 different organisations in nine different countries were involved in the citations, and 45 different organisations when the self-citations were involved. These figures demonstrate clearly the wide dissemination of dissertation information. 50% were from the USA, followed by 23% from the UK (3 1 % if self-citations are included), with the remainder ("Other" in the table) including Australia, Denmark, Finland, Germany, Japan, Russia and Switzerland. Universities accounted for 60% of the total number of organisations, with members of LIS departments accounting for the greatest numbers of citations. 28% of organisations were in industry or commerce, and the citing sources were generally staff in pharmaceutical, information or computer companies.

Publication is perhaps the most obvious form of public output from a research project, but there were many other ways in which the results of these dissertations were disseminated. Thus, the external contacts noted the production of seven databases, five software packages, two World Wide Web sites, a CD-ROM and a hypermedia demonstrator; the contacts also noted that eleven of the projects had been reported at conferences, meetings, courses, exhibitions and other events.

Conclusions

This paper has discussed the principal results of a survey of the dissertations produced by UK students on the MSc programmes at the Department of Information Studies in the University of Sheffield between 1988/89 and 1994/95. This study confirmed previous findings that the dissertation project is of significant benefit to the students, giving them the opportunity to develop a range of skills that many of them found valuable both in gaining and in carrying out their subsequent jobs. The students' supervisors and external collaborating organisations also used the dissertations in various ways, as did other Departmental staff and students. Whilst dissertations are not intended for publication some were of such high quality, interest and novelty that papers were produced, and the citation studies demonstrate that the information contained therein was of value to a wider readership.

The three groups studied here – students, supervisors and external organisations – correspond broadly to the first two groups of individuals identified by Martyn and Cronin[19] in an examination of the ways in which British Library Research and Development Department Projects could be assessed in order to determine their effectiveness. Specifically, Martyn and Cronin identified four groups that could be affected by LIS research: the workers and associated staff who actually carry out the work; the persons or organisations for whom the work is carried out; other similar persons or organisations; and society at large. While the present study clearly encompasses the first two of these groups, it was not possible for us to question directly members of the last two groups; however, the survey provided clear evidence of the wider use of dissertations, and the information they contain, by these people. Examples include the figure of 51% in Table 6 (staff response regarding use of dissertations by external organisations) and the residual citations to dissertation-based publications that are detailed in Tables 10-12. A dissertation is valuable to a student in that it enables him or her to satisfy the academic requirements of a university higher degree: the results presented here suggest that it may also be of value to a much broader constituency.

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Information needs and information seeking patterns of medical students at Lautech, Ogbomoso

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Abstract

A survey was conducted to investigate the information needs and information seeking patterns of medical students at Ladoke Akintola University of Technology (Lautech) Ogbomoso, Oyo State, Nigeria. 54 questionnaires were sent out to medical students for compilation of data for this survey out of which 53 or 98% were received and analysed. The survey revealed that 70% respondents spent 3-8 hours in the Library to consult books that are relevant to their areas of specialisation, and 68% of this category approach Lautech Library staff for various assistance in the course of searching for books of their choice. All of the sample agreed that the Library staff are always willing to assist. Various suggestions were made by the respondents for the improvement of the Library and staff alike.

Literature review

The need for information is not new in the developed countries. It is however neglected in the less developed countries. The complexity of the information arena, the rapid change in the information technology field and the dearth of information resource materials often create confusion between the information seeker and the librarian/information specialists that provide the information[2]. The need for information, at various fields has been widely organised as a vital resources in economic health, political, educational development. This assertion prompted Adimorah to stress that the recognition of the importance of information in every facet of the national development plan of any country is an index of the operations of the nations information policy. On the other hand information seeking patterns depends on the needs of individuals. Thus medical students tends to tailor their information seeking patterns towards their needs.

However, the main function of the Ladoke Akintola College of Health Sciences as stated in the University brochure[5] is to train physicians who will:

(i) Provide health care in a combined hospital – community system with major emphasis on primary care.
(ii) Relate medical education so that the physician could be able to diagnose and manage community health problems.
(iii) Developed and provide for health personnel programme of postgraduate training and continuing education.
(iv) Develop research programme that address primarily the actual health needs of the community.

The medical curriculum of Lautech, is different from the traditional university curriculum. It is a five years' plan after the first compulsory one year for all students. The five years' plan covers Basic Medical Sciences, Clinical Sciences and Community Health Sciences. This will enable students to apply the knowledge imparted to them for the services of their respective communities.

The determination of the information needs and the seeking patterns is a prelude to an effective identification and operation of a national policy on information. The determinant factor of service types is libraries and information centres aimed at satisfying user needs. In academic libraries whose collections policy tend toward technology, it is pertinent to observe that scientific information is "sin-qua-non" to the incoming generations. Adedigba[1] established the fact that there is need for empirical research into the information needs of scientists including the medical personnel in Nigeria. From the above perusal of the literature, it is more than obvious that for any meaningful, appreciable and rewarding contribution to be made in the health sector, information needs of the medical students and the method of meeting the needs must be well established for and adequately utilised by the new entrants in medical and health care.

Purpose of study

The objective of this study in no way claims to be exhaustive but, tries to discuss the needs, the seeking patterns of the information, its use and the response obtained by the library staff of Lautech by the medical students of the institution. In other words the study attempt to answer the following questions:

(i) What are the information needs of the medical students at Lautech?

(ii) How do they seek the information they need?

(iii) How do they make use of the information available to them?

(iv) What are the inputs of Lautech library staff in their attempts to meet the information needs of medical students?

Research methodology

Questionnaire methods were used to elicit information from the medical students. In addition to using questionnaires, the researchers were able to have direct contact and oral interviews with the students to cross-check facts as provided in the questionnaires.

Fifty four (54) questionnaires were distributed to the 300 level medical student (being the most senior medical students of Lautech) out of which fifty three (53) questionnaires were returned completed. Only one copy was outstanding at the time of analysis. Thus the data subjected to analysis was based on 53 or 98.14% respondents. Analytical techniques adopted include tabular presentation of data and use of percentages.

Data analysis and research findings

After the analysis of the data, the following results were obtained.

A. Sex

It was discovered that, out of fifty three (53) respondents thirty four (34) or 62% were male while 18 or 33% were female and one student failed to indicate sex.

B. Orientation on library use

Almost half of respondents indicated that they had no formal orientation on the use of library, in fact the medical students responded in the affirmative that they have not been exposed to library use either in practice or in theory.

C. Numbers of student-hour use of the library per week

The students' responses indicated that they use several hours in the library to read or do assignments. Only 2 or 4% responded spent fewer than 1-2 hours in the library per week. 37 or 70% respondents used between 3-8 hours in the library per week while seven or 13% respondents spent more than 8 hours in the library per week: the rest did not respond to the question. See table in the appendix.

D. Reasons why students come to the library

There were various responses here from the students. Out of 53 respondents 35 or 66% indicated that they came to library for consultation of monographs and other materials related to their studies. 11 or 21% respondents came to the library to read newspapers. 4 or 7% respondents came to library mainly to consult reference books. 1 or 2% respondents came to the library to read newspapers and browse through library collections. This finding especially (browsing through library collections) is different from what obtained in Georgia Institute of Technology (GIT)[4], where it was observed that browsing was the most important method used by them to learn about library books. This may be due to availability of several information sources to be perused, or database collections that are efficient. However in Lautech here many of the respondents had no previous idea of retrieving information from the library. See table 2 in the appendix.

E. Use of other libraries

In table 3 below, 33 or 62% respondents had never used or contacted other libraries, not because they are satisfied with medical collections in Lautech library but time did not permit them to do so. 19 or 36% respondents indicated that they use other university libraries whenever they have the opportunities. Only one student failed to respond to the question. See table 3 in the appendix.

F. Supply of information needs

Various information source were mentioned and the researchers allowed for multiple responses from respondents, hence the response overlapped each other. Out of the 53 respondents 50 or 44% revealed that they depend mostly on textbooks for information on their course, 27 or 24% got information from lecturers. This was in accordance to Nweke's[6] findings which revealed that medical students used textbooks and their lecturers more than any other source of information. 15 or 13% respondents source their information through reference. 7 or 6% respondents got information from review, 5 or 4% contacted journals. 3 or 2% relied on pamphlets and newsletters while only one or 0.86% obtained information from conference proceedings as shown in table 4 in the appendix.

G. Lautech library staff willingness to help

Out of 53 respondents 36 or 67% indicated that the Lautech library staff are always willing to assist them whenever they approach them for assistance. 11 or 20% respondents signified that the staff are reluctant to help while 6 or 11% said they had no opinion about the library staff.

Areas for improvement in Lautech library

Respondents were asked to comment freely on areas of improvement at Lautech Library as it affects them. Various responses were obtained from the respondents on the following areas:

(i) Size of the Library

Respondents complained that the Library is small for the university and urgent attention must be given to complete the new library so as to provide space for the users.

(ii) Size of Collection
Respondents reacted on the size of the collection of medical textbooks and journal in the Lautech Library which they regarded as small and out dated. They request the library to acquire more up to date relevant textbooks for the use of staff and students.

(iii) Attitudes of Library Staff
Almost 3/4 of the respondents commented positively about the staff: that they are willing to assist them when a request is made; while 1/4 remaining responded that orientation of staff must be constantly done to remind them of their purpose in the library.

(iv) Hours of Opening
Respondents requested that the 8-6 p.m. hours of opening should be extended to allow them use the library resources maximally.

(v) Numbers of Book to be Borrowed
They also plead for increasing the numbers of books lent out to them to four as against two and they wanted the period of borrowing to be extended to two weeks instead of week-end only.

(vi) Photocopying machines, and other equipment should be provided for photocopying of materials to avoid mutilation and theft.

(vii) Security of the Library is not very tight and users can seize the opportunity to remove some of the important books in the Library.

Conclusion

The following conclusions were drawn from this study;

(a) All medical students of Lautech had no orientation on the use of library. This made them depend on the library staff for assistance.

(b) Lautech medical students relied heavily on library books for their courses. This may be as a result of the high cost of medical textbooks.

(c) Students used several hours in the library to consult books, journals and newspapers.

(d) The library at present is very small and not very condusive for reading for several hours.

(e) Not all the staff of Lautech library assist the students when a request is made.

(f) There are lapses on the security system of the library thus cases of book theft is often reported in the library.

Recommendations

(i) From the study it is established that the respondents are clamouring for a bigger library which will be condusive for reading for several hours; provision of more chairs, acquiring of more textbooks which are very current must be acquired for the library to satisfy the students request.

(ii) The respondents also requested for extension of the borrowing period to about 2 weeks instead of weekend only, and the numbers of books to borrowed should be increased to four instead of two. This should be attended to with utmost urgency.

(iii) All students of Lautech should be given library orientation and the university authority should be made to include the use of library resources as part of the General Studies (GNS) course which will be compulsory for all undergraduate students in the university[7]. The inclusion of the course will give students the opportunity to learn about the use of various bibliographic tools in their specific disciplines and how to conduct literature search in the library.

(iv) It is also recommended that photocopy machines should be provided in the library for users in order to prevent, stealing and mutilation of books.

(v) It will also be pertinent if stand-by generator is provided for the computer and other equipment that uses electricity in the library for efficiency.

(vi) Finally it is recommended that the staff of the library should be given orientation on the way to assist users, so as to make them (users) utilise the resources of the library fully.

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APPENDIX

No of hours	No of respondents	Percentage of students
1 – 2	2	4
3 – 4	9	17
5 – 6	16	30
7 – 8	12	23
(7) Above 8	7	13
Not indicated	7	13
TOTAL	53	100

Table 1. Number of hours students used in the library per week

What students do in the library	No of respondents	Percentage
Read Newspaper	1	2
Consult text books	35	66
Consult reference books	4	7
Browse through library collections	1	2
Consult Newspaper	11	21
Browse newspapers & books	1	2
TOTAL	53	100

Table 2. Reasons why students came to library

Information need	No of respondents	Percentage
Contact other libraries	19	36
Do not contact other libraries	33	62
No indication	1	2
TOTAL	53	100

Table 3. Supply of information needs

APPENDIX

Source of information	No of respondents	Percentage
Discussion with lectures	27	24
Textbook/Monograph	50	44
Journal Articles	4	3
Reference Source	15	13
Abstract/Indexes	-	
Bibliographies	-	
Annual report/Technical report	-	
Conference Proceedings	1	
Pamphlets/Newsletter	3	2
Review	7	6
Thesis/Dissertation	-	
Others	5	4
TOTAL	112	100

Table 4. Source of information

Library staff willingness to help	No of respondents	Percentage
Willing to Help	36	67
Reluctant	11	20
Others	6	11
TOTAL	53	100

Table 5. Library staff willingness to help

Communications 98; a review. Part 1

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The absence of servants has compelled Americans to adopt communications systems for domestic purposes. Here we have a superabundance of messengers, errand boys and things of that kind.
Sir William Preece, Post Office Chief Engineer (1879).

The new data networks and the new services they will carry depend on big bandwidth. No bandwidth, no business.
Computer, October 1997.

This review covers those aspects of communications which are relatively new and will probably have a continuing impact for at least two years – although this forecast, like nearly all other forecasts, is likely to be mostly wrong. A small amount of essential basic material is included – such as the section entitled 'The bandwidth/speed imperative', So much effort is being devoted to this subject, particularly in the case of POTS (Plain Old Telephone System) improvements, that a few words about it seems to be in order.

Human communication – meaning the study of speech and language – is an important subject but 'communications' as used in this review refers to telecommunications. According to a January 1998 issue of *The Times*[1], telecomunications is one of the world's biggest industries At the beginning of 1997 there were 742 million telephone lines in the world and 137 million mobile subscribers. Expenditure on telecoms in 1966 was $670 billion. This represents a very rapid growth rate since I first reviewed progress in communications 18 years ago[2]. 1980 was a good time for a review – some interesting developments discussed in the late seventies were in progress although the forecasts were often inaccurate. IBM's grandiose Satellite Business Systems scheme with Comsat and Aetna, which, according to Stearns[3], was 'expected to be very successful' turned out to be remarkably unsuccessful. Martino[4] correctly forecast the arrival of telecommuting but believed that videodiscs, not videotape, would be the medium for home recording.

The less speculative pieces which appeared in a 1979 issue of the Proceedings of the Institute of Electronics and Radio Engineers ('Proc IEEE') contained some weighty articles about networks by well known pioneers. Vinton Cerf and Peter Kirstein discussed the very early days of the ARPA-sponsored Internet[5] while J.C.R. Licklidder ('Lick' to his colleagues) and Albert Vezza considered a range of thirty possible major applications including product buying and selling and funds transfer which at that time were non-existent[6]. The October 1997 issue of the same journal (several articles from it will be cited later in this article) provides up to date descriptions of current major activities. The UK's record in this field is second to none. It is of interest to note that the issue's guest editor is Peter Cochrane who heads the team of over 600 researchers at BT's Martlesham laboratories. Four out of the ten (excluding the first) major articles are by BT authors. The first is a reprint of a 1922 article by one Gugliemo Marconi entitled 'Radio Telegraphy' from the Proceedings of the Institute of Radio Engineers (Proc.IRE) which later became Proc.IEEE. Marconi, whose research was carried out in England, had previously described his transatlantic transmissions following an Institute dinner at the Waldorf-Astoria in 1902.

In this 1998 article, a number of dominant aspects and applications of 1997/1998 communications will be discussed under the following headings:

Telecommunications politics.
The bandwidth/data rate imperative.
Selected applications of Networks.
Satellites, fibre and cable.
The Internet.
Mobile communications and Standards.
Visual telecommunications.

Telecommunications politics

Vice-President Gore believed that his utopian dream of 'universal telecommunications' could be realised by an investment of $100 million in order to 'connect optical fiber to every home, office, factory, school, library and hospital'[7]. In fact two major forces have played the most important part in the recent rapid growth of communications. The first covers two continents – deregulation in the United States culminating in the February 1996 Telecommunications Act and the EC's efforts to establish a unified communications strategy initiated by the 1979 'Dublin report'[8].

Deregulation in the United States was the major enabling force which John Maney called the 'technological convergence of televisions, telephones, computers and contents into one technology, one industry'[9]. The major event which started this convergence was the proposed $33 billion merger between Bell Atlantic and the largest U.S. Cable-TV company Telecommunications Inc, (TRI). This proposal came to nothing but there has been a large number of proposals and actual mergers since. Bright gives the reason for telecoms globalisation which started in the nineties as 'the demand for multinational corporates for end-to-end communications services from a single supplier'[10]. The very large number of alliances and realignments which were completed are shown in an Ovum report[11].

The U.S. 1996 Telecommunications Act eliminates the regional and long distance divisions and removes the area boundaries between the Belcos – the Bell companies which were formed by the divestment of AT&T's operating companies in 1982. The expected result will be the formation of a few super-regional companies and the arrival of a number of smaller competing companies offering a variety of services, coupled with substantial price reductions. 100,000 jobs could go in the large companies but there should be a net gain in the total number of jobs.

Inter-industry mergers are prevented by The Act. Joint ventures are not covered and are permissible. It encourages separation rather than mergers between cable and telephone companies. The Act allows telephone companies or cable companies to own only up to 10% of each other. Belcos, unlike cable companies, do not own wideband connections into homes. They have already ordered a quantity of ADSL equipment (see 'bandwidth and the local loop' section) so that data rates over their ordinary telephone lines would then be substantially faster than the limited increase made possible by ISDN. Bandwidth improvements brought about by costly installation of exchange to subscriber wideband cabling would then be unnecessary. Stephen Brown, president of a U.S.Market research company, thinks that the restrictions set out in the Act are a mistake and asks 'how long will it be before the legislation is reworked?'[12].

Steady progress makes boring newspaper stories – they must contain bad or good news to possess news value. A *Times* reporter, Bronwen Maddox, chooses to represent the effect of the 1996 Act as bad news[13]. According to her 'The president said at a stroke of a pen our laws will catch up with the future' but 'The Act is a fair candidate for the messiest legislation Congress has passed for years'. Prices have risen steadily since it became law. The Federal Communications Commission (FCC) has yet to decide what to do about cross subsidies which, in the past, have enabled local calls to be offered free or at low cost.

Turning to Europe, Thomas Ramsey, an American attorney, provides an excellent review of the situation which faced the European Commission (EC) in 1981[14]. He refers to the economic and political strength of the PTTs, the absence of pan-European producers of teleinformatic goods and services and the ineffectiveness of EC institutions in carrying out the fundamental objectives of the Treaty of Rome, Carlo de Benedetti, chairman of Olivetti, believes that 'Conflicts of interest paralyse the decision-making process or spin it out to such extremes that European markets, industries, and institutions often give the impression of unchangeable, immovable objects in a highly fluid world. A lot of chat and no action turns information highways into information hypeways'.

Jo Rogaly, writing in The Financial Times has little time for the EC[15]. 'The European Commission wants to run information technology and communications. People behind desks in Brussels cannot help constructing schemes that give them more work to do. It is in their nature to create a demand for more people to sit at more desks all around them. They sincerely believe that the intellectual constructs adumbrated in their drafts and debated in endless committees will benefit mankind'.

These cynical comments may contain an element of truth but they do not touch on the need to remedy some of the depressing prospects described by Ramsey. He writes about 'Diverse and divisive national strategies... a purely national and uncoordinated approach will not suffice to bring European enterprises into a competitive world position... PTTs have developed distinct technologies, procurement procedures and tariff and service policies which render economies of scale difficult and expensive... the most difficult problem will be the creation of a homogeneous market'.

It would be a gross understatement to say that the EC has had an uphill task. It will have taken nearly twenty years from the Dublin agreement to reach a situation where major telecommunication markets are open to full competition provided that the appropriate legislation is implemented. In April 1993 the EC ministers voted to delay full liberalisation of public voice telephone services until 1998. A 1993 'White Paper for Growth' was followed by plans submitted in June 1994 by commissioner Bangemann to liberalise telecoms by 1998. Even then, Portugal, Ireland, Luxembourg and Greece will not fully liberalise for a few more years.

A survey designed to assess business attitudes towards telecoms competition was commissioned by BT in September1997.[16] It covers 450 different organisations in nine European countries and reports some interesting results. Most major countries except UK were frustrated by the slow pace of liberalisation. The survey results say that 86% of those questioned stated that for 'European business to remain competitive globally, liberalisation of telecoms is vital'. It is also mentioned that private circuits, widely used by large businesses, are ten times as expensive as their U.S. equivalents on a kilometre for kilometre basis. Examples provided by Gannon for 2 Megabit per second (Mbps) private leased lines ($US monthly rental) include $60,000 for London-Zurich (1600 Km), and $6000 for Chicago-New York (1125 Kms)[17]. Gannon suggests that crossborder pricing was 'pushed aside' so that EU countries could be more easily persuaded to agree on other liberalising matters. January 1st 1998 was the date by which major markets are supposed to open to competition for all services. According to the BT survey only 4% of British businesses are aware of the significance of this fact compared with 68% awareness in Germany and 52% in France.

In the UK, liberalisation followed by privatisation took place much earlier than in other European countries. It appears that BT offers better services at lower prices since privatisation. The company substantially reduced the number of people it employed – a process accelerated by the increased rate of the introduction of new technology. For example almost all its exchanges are now software-controlled instead of being manned by telephone operators.

In 1996 BT published a press release claiming that its interconnect charges for delivering calls from someone else's network are the world's lowest. Its retail telephone tariffs are also among the lowest in the world. Leased line charges were (advisedly) not mentioned.

The bandwidth/data rate imperative

The volume of water that can be carried by a hose resembles the volume of data that can be transmitted along a conductive media such as a cable. The greater the diameter of the hose or the wider the bandwidth of the cable the greater the volume of water or data that can be carried. In the case of data, the transmission rate of elements is limited to twice the width of the channel's frequency band. Thus 10,000 data elements per second may be transmitted and received without distortion through a channel with a bandwidth of 5000 Hz. The information rate may be increased by sending several bits per signalling element. This explanation is sufficient for the purposes of this review. For more information see Cawkell (1991)[18].

The volume of data and its delivery at a rate which is adequate to represent moving images in colour of acceptable quality, requires that the data be delivered via a wideband channel. A typical single picture could contain 10 megabits of data; when repeated 25 times per second in order to represent motion, the bit rate becomes 250 Mbps. This rate is well outside the range of the great majority of existing channels. The telephone system as it stands, providing a connection to most homes and all businesses, was designed to transmit speech in the frequency range 300 to 3500 Hz.

Some services require that the 'downstream' (from source to user) bandwidth be much wider then 'upstream'. A 'movies on demand' service requires sufficient upstream channel bandwidth to deliver customer commands, while the downstream channel must be capable of conveying moving pictures. Interactive television will require similar facilities, although services may be developed which require wideband facilities in both directions. Many of the current telecom developments are directly or indirectly related to devising methods of sending more information faster through existing channels. The cost of increasing the bandwidth or compressing information using electronic artefacts, is usually far less than the cost of physically replacing a channel with another of the required bandwidth. Human perception of compressed text, graphics, colour etc., varies according to circumstances.

Substantial compression may sometimes be acceptable. Images reproduced with 'Poor quality', 'acceptable quality' or 'good quality' describe subjective judgements influenced by bandwidth, compression, system costs, or viewing circumstances. Acceptable quality when viewing a small telly in the kitchen is likely to be different from the quality required when critically watching a programme about fine art on a big screen. Accordingly there is some latitude in the provision of a service considered to provide 'generally acceptable quality'.

The two great rivals for providing wideband services are the cable-TV companies, and the telephone companies, It is assumed that that the bottleneck caused by the telephone cable between exchanges and subscribers will be eliminated. The bandwidth of the cable is degraded by devices associated with speech transmission connected to it and by its electrical characteristics. Telephone line bandwidth/data rate may be extended by the use of ISDN – a technology which is now used quite widely although it is rather expensive. The data rate may also be extended by the newer DSL technology. Special equipment is installed at either end to create a. DSL (Distributed Subscriber Line). DSL is usually prefixed with an 'x', indicating a variant – for example.ADSL (Asymmetrical Digital Subscriber Line). The data rate the line will handle is then in the range 1.5 to 50 Mbps downstream depending on the variant in use and the subscriber- exchange distance. xDSL should start to become available in the U.S. during 1998, and later in Europe.

BT announced two bandwidth-related improvements in February 1998. ISDN, too expensive for many people will be renamed the Home Highway and will not need special installation in the future – an adaptor will be plugged in to an ordinary telephone socket and a separate line will not be needed. Prices will be reduced[19]. Secondly, BT will invest three hundred million pounds to expand its existing broadband network using Asynchronous Transfer Mode (ATM) switching[20],

ATM is a form of packet switching with microsecond instead of the usual millisecond interval between packets, making it much more suitable for video and voice transmissions. An 'ATM switch', not to be confused with 'packet switching' is a multiway continuously-operating cross-point switch which changes connections at a rate which is far higher than packet rates. Users of services delivered via such switches are unaware of their presence.

As well as cable-TV and wideband telephone routes, fast services via wireless or satellite systems are likely to come into wider use. For example, services are available for directly downloading data from the Internet.

Methods of compression and data reduction have been in use for years but they are steadily becoming more effective. Images have received particular attention because of the huge volume of data which is required to represent them and the need to repeat them as mentioned earlier. Compression techniques include redundancy reduction, transform coding, and fractal compression. Like information transmission, compression is outside the scope of this review. It is discussed in detail in Cawkell (1994)[21].

Selected Applications of Networks

Network Computing (NC)

Section D of an Ovum report[22] devotes a number of pages to a new telecommunications technology, introduced in 1996, called Network Computing (NC). Ovum defines NC as a system which 'offers e-mail, Web browsing, electronic commerce and software applications such as word processing and games. An NC accesses applications over the Internet and does not have a hard disk'. The price is under $500. Development guidelines were announced by Apple, IBM, Netscape, Oracle and Sun in May 1996, with a further announcement covering mobile NCs in June 1997.

Java, a programming language developed by Sun, is an important part of the NC concept[23].

When Java 'virtual machine' software is loaded into an NC or a PC, downloaded Java programs will run on any type of machine or operating system. A Java virtual machine will run a complete interactive application called an 'applet' after the applet is dowloaded. As an example, Sun describe an an applet financial program linked to a Web site, consisting of a set of pages for displaying data. Current stock prices and animated graphs showing historical price fluctuations are immediately available from the site. The importance of a fast communications link is obvious.

As far as home users are concerned, as pointed out in the Ovum report: 'with no fast residential networks in place the NC desktop is ahead of its time. As it takes longer to download applications over available networks then it takes to start up a PC, network technology forms one of the major bottlenecks in the uptake of NC desktops in the home'.

Much of the enthusiasm for NCs comes, of course, from its protagonists. Others who are not part of the 'in group' are less enthusiastic. In a survey carried out for Compaq it was found that 75% of respondents did not expect to buy an NC within the next two years. However Ovum thinks that worldwide shipments of NCs in 1998 will be 82,000, nearly one million in the year 2000 and nearly six million by 2005.

Library and Educational Networks

Two reports have been published recently – 'Preparing for the information age: synoptic report of the education department's superhighway initiative (EDSI)'[24] and 'New library: the people's network'[25]. Their titles self-evidently show that the work described therein is heavily dependent on communications.

Computers and their applications make stories which the press believe that everyone wants to hear; Driving along the information super-highway is a great new adventure, but does it result in improvements in teaching and learning? EDSI 'activity for learners' projects ran for nearly two years during which 25 projects and sub–projects, mainly carried out in schools and colleges were pursued. It is claimed that EDSI demonstrated a number of benefits for learning, 'Any ICT (Information and Communications Technology) intended for universal take-up needs to be demonstrably educationally valuable, widely available, affordable, reliable, technically supportable and useable' says the report.

The foreword describes the report's objectives – considering how best to use them to ensure that teachers are information and communications literate, connecting schools, keeping charges as low as possible, providing content, and removing barriers to learning for everyone.

It has been said that computer-based multimedia is similar to face-to-face communication, less restrictive than written text, can improve understanding of abstract concepts, and can allow for paced learning. However there is a corps of non-believers. As an outsider looking-in it is hard to decide how beneficial these systems are, or more particularly how effective is their content, and whether they will result in improved teaching and learning. Lydia Plowman is a research fellow at Sussex University. She writes: – 'In spite of great steps forward in cognitive psychology, we have to admit that we still know very little in terms of how people learn' and 'Few programmes make any attempt to establish what the student already knows in the domain'.

Later, she wrote an article with Dr.Chambers, who is a senior lecturer at the Worcester College of Higher Education[26], saying: 'Other workers conclude that there is at present no coherent model of learning to support design... many of the studies have shown no significant advantages of gains from use of the new technologies. The expectations of the media designers have not been realised in practice'; and 'effective design is problematic' although 'there is little doubt that multimedia applications can be designed to be highly motivating and entertaining. Making them also educational is more of a challenge... educationalists have too easily fallen for each new technology as it has been presented as having the potential to revolutionise education, and none has been slicker than multimedia'.

And referring to CD systems: 'The poor quality of the material provided for these systems is a constant refrain. Users are impressed with the technology but disappointed with the software'. Plowman and Chambers end on a more optimistic note. 'If new software is designed to exploit available technological features and meet the criticisms of teachers, such systems are likely to be received more warmly and be assured of a place in classrooms.

Diana Laurillard, a senior lecturer at the Institute of Educational Technology at the Open University, says in the introduction to her excellent book:[27] – 'Vast sums are made available to investigate the best way to use computers, where the subject matter taught is incidental. The more rational approach, seldom adopted, is to offer vast sums to investigate the best way of teaching a particular topic, and through that to fund the use of computers as an incidental part of the strategy. As a result of irrational funding we have studies that tell us that computers, video etc., can be effective and also fail utterly, but we have very little idea about how they work in combination, or how design relates to the content being taught'. The blurb on the back cover quoting praise for her book says: '...a copy of it should be sent to the Vice Chancellor of every university with an exhortation to take some time to read it carefully'. I second that proposal.

Returning to EDSI, the project came up against various problems of communications and costs. With regard to videoconferencing it reports:- '...the various systems used were generally compatible for two-site discussions'. but 'the lack of full compatibility severely restricts the educational potential of the medium'. In regard to system compatibility problems: 'there was confusion over whose responsibility it was to resolve them' which 'arose in relation both to very well established kinds of system and to less well established ones...'.

The report comments about costs: '...the true current costs of running substantial intermediate or broadband networks was beyond what most schools would be willing to pay without external support... it is clear that some significant increase in resource allocation will be essential if schools are to move beyond the introduction of a single modem linked to a conventional phone line'.

EDSI project supervisors are only confirming what those of us who are involved in this area know only too well – computers and telecoms seen through the eyes of a voluminous enthusiastic technical press, much of the the volume consisting of advertisements, are rather different from the same seen through the eyes of the user who is not supported by a substantial training and technical backup department. In a letter to *The Times*[28], Professor Thimbleby, a Ph.D in computing says: ' I know that we could have easier to use technology if people fought for it... Many people are caught up in a culture that thinks problems with things are their own fault... I still can't operate my computers, cameras, fax machines, photocopiers, and mobile phones satisfactorily'. How well will the schools of the future cope?

The National Grid for Learning, discussed in the second report 'New library: the people's network', is an ambitious project. 'Networked resources offer opportunities for adults to follow a personal learning path... In partnership with schools, colleges and uniiversities, the public library will allow flexibility of study in both time and place' says the report. Recommended expenditure for the network infrastructure which includes a UK backbone, local networks and equipment over a 6 year period is nearly five hundred million pounds.

The EDSI report covered work done in the two previous years. The foreword says 'We are now looking carefully at the outcomes and considering how best to use them to underpin our new plans for the National Grid for Learning' – implying that the EDSI work constituted experimental foundations for the National Grid. But the National Grid report contains no reference to EDSI in the text; its references are listed by countries of which there are 15, but the UK is not among them. It seems strange that so far as the National Grid report is concerned, EDSI might never have existed.

In January 1998[29] it was announced that the National Council for Educational Technology (NCET) would be 'reshaped' to become the British Educational Communications and Technology Agency (BECTA) which 'will support the work of the government and running of the National Grid for Learning'. It will be interesting to see what financial support the scheme receives and whether it progresses to the benefit of the country.

Support may be forthcoming from telephone or cable companies. Before the 1997 election BT discussed the possibility of a deal with the Labour Party whereby they would provide a free cable connection to every school, hospital and library in the country in return for being allowed to provide cable entertainment services. After Labour was elected, OFTEL, the telecom regulator, said it would not approve such an arrangement. They preferred to see whether the cable companies could provide connections and a choice of Internet service provider. OFTEL will publish a consultative paper in July 1998.

Apart from possible nationwide library networking, telecoms is an important part of most electronic library work One of the most ambitious experiments is continuing at the University of Surrey[30]. The purpose of 'Project Patron' is 'to deliver on-demand digital audio, video, scores and text in the areas of music and dance across a high-speed ATM network'. A most important aspect of the experiment, unfortunately outside the scope of this article, is to investigate encryption and copyright clearance – a major pothole on the information superhighway.

The system uses an IBM RS6000 server and streaming software for distributing multimedia files. The streaming of multimedia material over a network is also outside the scope of this article. Video data is compressed by MPEG-1 and travels at 3 Mbps over the network. In due course the system will be connected to the campus LAN.

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Electronic networking in Nigeria: prospects and challenges

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Abstract

The paper examined the need and the various attempts being made to go networking in Nigeria. It discusses the advantages derivable from shared resources between organisations institutions and various professional bodies. It cites the attempts of the Nigerian Intranet Group NUNets by the National Universities Commission and the co-operation between the Obafemi Awolowo University Ile-Ife and the International Centre for Theoretical Physics from Italy as worthwhile which should be encouraged. It however highlights some of the challenges facing these attempts in a developing country like Nigeria. Some of these are poor telecommunication systems, ineffective use of information technologies, inadequate financial backing and even lack of the technological know how. It finally advises that by the turn of the 21st century resource sharing electronically should be a common phenomenon in the developed countries.

Introduction

The use of electronic networks has become widespread and in high demand in the developed countries where the academic and research communities, organisations and the business world use networks to share their resources electronically. The most recent of the electronic network is the Internet which provides a means of access to networked information resources world-wide. Klobbas[1] describes the Internet as an electronic communication network which provides access to electronic mail (e-mail), electronic conferences, discussion groups and electronic information resources (including computer files and databases) held in computers around the world. To Mcombs[2] the Internet is one of the most instantaneous and far-reaching methods of information delivery available and identifies three basic applications on the Internet as e-mail, remote login to another computer and file-transfer from a remote computer to another computer. Of the several Internet utilities designed the most important is the World Wide Web (WWW). Nigeria as a developing country has in the last five years or so shown interest in developing its own Intranet through which it can hook up to the Internet and to the outside world. The interest has been spearheaded by some local organisations such as Nigeria Intranet Group (NIG), National Universities Commission (NUC) and a foreign body – the International Centre for Theoretical Physics (ICTP) in conjunction with the Obafemi Awolowo University Ile-Ife. However in spite of the awareness created on the need for a national network to link all the databases in the country to form a network of networks, not much has been achieved. Why has this been so and what really could be done? This paper provides answers to these questions.

Advantages of networked delivery services

Ever before this new technology became the in-thing libraries have for ages engaged in inter-library loans to share their resources. The advent of electronic networks has made the sharing of resources not only faster and cheaper but has opened a floodgate of resources available in different parts of the world. For library technical services like cataloguing, acquisitions and serials, networking can aid the librarian to process information electronically. Through a national network information about different aspects of life in Nigeria, such as professional academic, social and political will be made accessible for both internal and external use. In return Nigeria will also benefit from foreign data at a reduced cost. According to Miller[3] some networks are geographically delimited. others are discipline oriented, mission oriented and special service networks. Examples of discipline oriented ones are networks for museums. chemists, humanists, social scientists and economists. A case in point is Databoard Nigeria Limited which has embarked an a discipline oriented network on Insurance[4]. With this operators of insurance companies in Nigeria can now relate on the computers from their various offices to achieve excellent professional practice at a cheaper rate. This is done through easy access to information made available on diskettes as a reference point to the insurance practitioners to seek and get counselling from their professional colleagues without any personal interaction. This type of point to point contact will facilitate daily business practice as retrieval of information is made easy and several times faster.

Nigerian scene

Initiatives to go networking in Nigeria has taken a two-pronged approach. The first approach has been through organisations like the Nigerian Intranet Group (NIG) and the Databoard Nigeria Limited (DNL), both of which have made concerted efforts to create awareness in users in the media, industries, academia and in businesses. With the effort of the Database Company, the insurance industry may be the first to properly and profitably embrace the advanced use of computer network ahead of others in sharing information among professional colleagues. The (NIG) on its part, organises a two-day seminar in Lagos on the 6th and 7th September, 1996 with the objectives of (i) development of strategies to implement affordable widespread and sustainable Internet connection in Nigeria; (ii) to provide a forum for discussing the developments of database and future of networking in Nigeria; (iii) promotion of the benefits and markets for Internet services in Nigeria and (iv) further promotion of Internet awareness in the country.

The other approach has been through the Nigerian Universities. In 1995 the National Universities Commission (NUC) planned a network for all the federally funded Universities. It organised a two-day workshop on Electronic Networking of Nigeria Universities to sensitise and prepare the Universities for a phenomenon that has long been in use in developed countries. That workshop represents the NUCIS first sure and steady step towards taking Nigeria into the mainstream of the world information highway. Participants and resource persons from within and outside Nigeria including representatives from all Federal Universities took part. In the words of the NUC's Executive Secretary at the workshop:

"Nigeria could not afford to wait until everything was in perfect place before embarking on the electronic network system, as failure to seize the initiative now would further increase the already widening gap between our nation and those countries that are already networked."

What NUC came up with is NUNets, a national computer network consisting of individual networks of all Federal Universities that will be linked to the global networks the Internet. At University level, NUNet is expected to be made up of developing network system at the level of Departments Units Centres and Faculties which together will form the Local Area Networks (LANs) of the University. This when linked together will form inter-University Wide Area Network (WAN) which in turn will be networked with NUC Abuja WAN.

To facilitate the support of participating Universities, each University is to establish a NUNet committee for the following:

- define the scope of the University network needs
- mount awareness programmes towards a systematic development of a strong user base at departmental/unit levels
- design and co-ordinate the gradual networking of the University at all levels
- maintain a strong liaison with the National NUNet Committee in NUC
- ensure that the University Central Network is connected to the NUC WAY
- ensure that the University has access to, through the NUC WAN to the nation-wide e-mail and Internet facilities.

Obafemi Awolowo University's example at Ile-Ife

Ever since the workshop organised by the NUC to create awareness in the Universities, there have been series of attempts made to go networking. This awareness has been given further impetus by a number of articles written in local dailies on the importance of network information resources. Most Universities now realise that they cannot afford to be indifferent to this technology if they must relate very effectively with one another internally and with the outside world as well. Individual universities are expected to put in place the machinery that will facilitate the generation of networked information resources. Obafemi Awolowo University, Ile-Ife provides a good example of individual attempt at networking. In 1996, the International Centre for Theoretical Physics (ICTP) based in Trieste Italy, in recognition of the present state of isolation of scientists in the developing countries began the installation of a project on Academic Computers Network for Developing countries. The main objective of the centre is to provide a veritable connection of OAU to the world via electronic means. It also has to provide hardware and software for the network gateway to be established at the computer centre of the University as well as hardware and software system for the links connecting the Physical Science and technology complexes of the University to the computer. OAU in turn has provided among other items the in-built coaxial connections for Local Area Networks (LANs) and the International Direct Dialling telephone facility for the network. Services to be provided by the centre include:-

- Normal Internet facilities electronic mails file transfer remote login, gopher, WWW etc.
- Information exchange within and outside the country will become simplified cheap and easily available.
- Researchers will have access to electronic journals, electronic libraries etc.
- There will be large reductions in the need for normal postal services and even telephone and fax services because most correspondence can be carried out electronically.

Networking provides a means by which a number of institutions could share programmes and databases using communication ties. It provides an alternative means of expanding computer services without increasing costs. Borko[8] observed that through networks. a large variety of databases and information services have become available to Universities as an extension of their own libraries. This is the most significant and the most exciting prospect for the application of networks for education. Also there will be less reliance on traditional academic publishers while there will be more use of the Internet and other forms of electronic communication. The growth of Internet offered academics much more immediate and appropriate means of research dissemination. Academics will be much more inspired if their work had a faster response from colleagues. For libraries and organisations to plan for networking, it is important to identify the type of information and data that will be useful to people in the educational sector as well as in business. Accessibility to the available database in any sector is a must.

Challenges

Before information resources can be shared, there must exist a rich database which interested patrons can access. This is badly lacking in Nigeria. In spite of the efforts made by individual organisations and institutions, not much success has been recorded. The fact is that a network of groups of organisations companies and so on, has to exist to allow them to share files on similar interests by accessing information stores of other remote computers. Until this can be achieved, networking in Nigeria will be a mirage.

The level of communications infrastructure is appallingly poor and this will adversely affect the operations of networking in this country. From all indications the NUNets planned for Nigerian Universities with emphasis on electronic mail is already experiencing some problems. So also, in network activities, the role of information technologies is vital. Abifarin[9] conducted a survey on the availability and use of information technologies in Nigerian University libraries. His findings revealed that lack of funds was the major constraint in the use of it in libraries. His conclusion was that the era of information technology has not fully arrived in Nigerian University Libraries.

In most Universities in Nigeria today computers are sparsely distributed. There is no evidence in the literature to show that co-operation exists among the departmental microcomputers existing in the Universities. The fact that intra-campus networking has not been feasible is a further testimony that accessibility to the resources of other Universities is still a far cry. Most computer installations in Nigeria are independent and this does not augur well for any country that appreciates the importance of information.

Funding is another major problem militating against information resources sharing in this country. For the past few years the annual subvention to the Universities has been drastically reduced. Without adequate funding, coupled with the poor state of infrastructure facilities like power and telecommunication systems it will be difficult to achieve networking. Nigeria as a developing nation is faced with the problem of under-development which is manifested in a number of ways.

Conclusion

It is clear that information networks can and must play a significant role in the management and dissemination of information in Nigeria if she is to join the developed world as a member in the web-like communication family. Nigerians should remain undaunted in an attempt to achieve networking even in the face of a glaringly inadequate telecommunication systems. Both individual organisations and institutions should work towards achieving this feat by the time we enter the next century.

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COMMUNICATIONS 98: A REVIEW PART 2

Tony Cawkell

THE PUBLIC RECEPTION OF THE RESEARCH ASSESSMENT EXERCISE 1996

Julian Warner

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Communications 98; a review. Part 2

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New media but uncertain futures

The writer of a review article in the IT area depends on a variety of information sources containing authoritative material, hyped-up reports, or even partial or pure fiction. Sometimes articles are biased or the author has a particular axe to grind – for instance the person is associated with a company and the article is no more than a dressed up sales piece. Academics are usually reliable – although unlikely to damn themselves with faint praise if the next grant is round the corner. I will try to exercise good judgement when assessing my information sources, supressing my various prejudices if possible. But what is meant by the word new? For the purposes of this article ATM (Asynchronous Transfer Mode) protocol (rules) and ATM switches in broadband networks, and aspects of Cable-TV and cable modems have received a lot of exposure. They will not be discussed here. However, there is much interest in the contest between fibreoptic systems to the home and the conversion of telephone lines to wideband lines. These topics will be discussed.

Telephone lines with improved performance, satellites, optical fibre or cable will be used increasingly during the next few years because they offer the means of transporting larger volumes of data faster (see 'The bandwidth/data rate imperative' in part 1). These media are capable of providing a wide range of services but it is the ends not the means which are of prime interest to most people.

Peter Cochrane worked in advanced media at BT laboratories at Martlesham and is currently Head of BT research. In his introduction as guest editor of a special issue of the Proceedings of the Electrical and Electronics Engineers ('Proc IEEE')[1], 'Communications in the 21st Century', Cochrane says 'From a human perspective there is only one important parameter in information technology – delay ... the papers selected reflect the fact that we do not have a sound understanding, or even a comprehensive coverage of the many variables that dictate the quality of service delivery'.

The big question put by Robert Lucky in the title of his paper in the same issue of Proc IEEE is 'New communications services – what does society want?'[2] Lucky was director of a research division at the Bell Labs for 10 years and is currently VP of applied research at Bellcore. Lucky thinks that user surveys 'seem to be nearly useless, if not misleading, for predicting future acceptance'. In surveys 'the questions themselves, unless unusually skilful, determine the answers' for example 'How would you like to have a video telephone? ... 'Well, since you ask, that sounds just great!' Lucky points out that 'there seems to be no trace of the Web in serious professional writings... a troubling admission of a failure in the vision of the industry. What instead has the industry foreseen? The future of telecommunications has told of people using video telephones. That future, however, has not happened ... experts are not much better at foreseeing the future or predicting the societal acceptance of new services'.

Also in the same issue of Proc IEEE, Michael Lyons et al., from BT Martlesham[3] write that 'future services are influenced by societal and economic trends and the actions of market players' so that a sensible course of action is to devise models which include demand possibilities in order to provide insight into the factors influencing service growth. The authors show a number of curves depicting the household penetration of various media/services in the UK including the advent and growth of Video On Demand (VOD), presumably meaning movies: 'It is assumed that VOD is available in year eight and has a price/coverage/utility combination that will allow it to grow into over into eight million homes within another 20 years'.

On the other hand, Ovum, perhaps the most reputable of the organisations engaged in market forecasting, believes that the UK installed base of what they call 'TV /set top box' devices, which will be needed for viewing movies and will be used as well for other services in the UK, will have reached just over three million by 2005[4]. This implies faster progress than is assumed by Michael Lyons et al.

Regulatory politics were discussed in part one of this article. Of course Telecommunications Industry politics affect the rate of progress as well. Turner[5] claims that 'It seems to be generally accepted that the long heralded convergence of telecommunications, broadcasting and information technology will be affected by the growth and capacity of the Internet'. Cable-TV has the bandwidth for downstream Internet and wideband services to homes. In the UK, mergers have resulted in Cable & Wireless becoming a major player in cable and, unlike countries such as France and Germany, they are not competing against dominant cable incumbents.

One way or another it looks as if the next few years in telecoms will be turbulent. The people whose job is to provide telecoms forecasts evidently have not been too good at it – judging by the earlier results for which we now have the benefit of hindsight. They also seem to have difficulties in forecasting plausible future scenarios. Since I do not possess their resources, Part 2 of this review will be confined to descriptions of certain branches of communications which are likely to influence the course of events.

Satellites and their services

The idea that satellites might be used for world wide communications was put forward in an article by A.C.Clarke in 1945[6] – the same year as Bush's Memex article, and just about as famous. Clarke pointed out that only three geostationary satellites were needed to broadcast to receivers anywhere on the surface of the earth. At the high frequencies at which satellites operate – originally up to about 32 GHz – very small directional aerials (U.S. 'antennae') are used to concentrate power in a beam capable of penetrating the ionosphere, illuminating the earth's surface rather like a searchlight with their 'footprints'. At these frequencies, a wide frequency spectrum is available for broadband communication channels. Recently the operating frequency band has been extended to over 150 GHz.

A major achievement was the setting up of the INTELSAT series of satellites for public international communications by a company called COMSAT in 1963. Since then hundreds of communications satellites have been launched.

Two informative articles about satellites were published in 1997 by Wu[7] and Montgomery[8]. Wu points out that in the nineteen eighties 'investment in satellite communications was not financially attractive' compared to fibre optics but he considers that today 'the field of satellite communications is thriving ... for broadcasting capability and mobility, the advantages of distant independent and instant installation, satellite communications is way ahead of any cable transmission, fiber or not'. Wu also says that: 'To link every home in the world to the Internet via fiber-optic cable would cost $300 billion. To do the same with global satellite coverage would cost about 30 times less or $9 billion.

'Conventional' satellites are launched in such a way that they assume a position above the same terrestrial spot 22,282 miles above the earth's surface. rotating once every 24 hours in a geosyncronous orbit – the so-called 'far GEO' orbit'. Their velocity just balances the earh's gravitational pull. At this height the round trip for a signal takes 0.24 seconds, introducing delay problems. To overcome them Medium Earth Orbit (MEO) and Low Earth Orbit (LEO) satellites orbiting at 6250-13,000 miles and 500-1500 miles respectively above the surface are being introduced. The disadvantage is that their closeness to the earth limits the area covered – unlike Clarke's basic three-satellite system – so that more of them are required for MEO global coverage and many more for LEO. They are not in a geosynchronous orbit so they move with respect to a point on earth and gradually lose altitude; replacements may be needed.

Difficulties associated with GEO satellite signal delays have been overcome for some services. They are used for relaying telephone, television, marine and other data. They are also widely used for VSAT (Very Small Aperture Terminal) – services. A VSAT service provides private communications – for instance between branches of a large company. It is easy to expand the network since additional relatively inexpensive dishes and terminals can be added for use at additional sites as required. For example companies such as Toys R Us, Citybank, Ford and Shell use systems supplied by Hughes Olivetti. In the United States Chrysler and Chevron use over 12,000 VSAT terminals between them.

There is intense activity to provide MEO or LEO systems. One system called GPS Navstar has been in use since 1993. It uses 24 satellites to provide accurate positional information for mobile receiving stations. The others are mainly associated with services for mobile telephones, or to provide Internet downstream data. A number of consortia are planning large MSS (Mobile Satellite Systems), each system costing up to $13 billion for worldwide portable telephones, to become operational during the next few years. Teledesic, for instance, will operate 288 satellites, each at an altitude of 435 miles.

Mobile communications have shown extraordinary growth which will continue apace with these new MSSs. Ultimately a system confirming to a proposed UMTS (Universal Mobile Telecommunications Service) Standard, currently being debated, will come into existence – an improvement on the highly succesful GSM (Global System for Mobiles) Standardised system already used by over 21 million subscribers in many different countries. At the technical level there is a national/corporate argument in progress over which type of channel multiplexing will be used.

The local loop

The relatively small number of satellite and cable systems currently in service are able to reach into homes and businesses with wideband communications, but ubiquitous telephone lines cannot, as presently installed, carry wideband signals. Sooner or later the telephone companies with their enormous investment of an installed switched system and hundreds of millions of telephone lines connected to homes and businesses round the world are going to convert them to wideband. For years fibre has been about to be installed between telephone exchanges and households. This is one of the areas where you have to be careful about author's forecasts – particularly if they work for a fibre-involved company.

But the once-ebullient forecasts about the replacement of the local loop wires by fibre seem to have receded further into the future. Vanston[9] says 'home and small business digital data demands will require all-fiber networks in the local loop within 20 years – although the rate of fiber penetration will depend on technology and market'.

Some additional information and views are provided by Tim Rupp[10]. The article describes the effects of the 1996 U.S. Telecommunications Act. Outcomes will have a major effect internationally. Rupp, a lawyer at California State University, takes a more favourable view of the Act than Bronwen Maddox (reference 13 in part 1 of this piece).

AT&T's early power in the US is evident from Rupp's statement that 'AT&T patented the telephone shortly after its invention and subsequently earned an average return on investment of nearly forty six percent during its patent monopoly from 1885 to 1894'. AT&T was divested of its subsidiaries in the nineteen eighties as described in part 1 of this piece. In 1994 three bills were presented to Congress proposing reforms. None were passed, but needed reforms were consolidated in the 1996 Act signed into law by the President in February 1996. Rupp concludes that 'the broad language of the Act ... allows for continuing flexibility ... By addressing concerns relating to universal service ... the Act sets the stage for a smooth transition to a positive form of competition'.

Rupp suggests that 'The tremendous capacity of a fiber optic network will allow simultaneous transmission of duplicate services to each user's home'. But Rupp has been overtaken by events; the emergence of xDSL, described in a later section, as fibre's main competitor is not mentioned. Rupp is discussing channel capacity so xDSL is likely to compete strongly with fibre.

Rupp makes an interesting point when he says about the NII (National Information Infrastructure): 'the publishers and recording and film studios that serve as the gatekeepers of the mass media in today's society will no longer have their current veto power. The lower critical mass necessary to make production of mass media profitable or worthwhile will allow small independent media producers to design customized magazines and newspapers that appeal to a very specific niche of customers ... providing an active forum for the exercise of First Amendment rights'.

He adds 'The NII (see reference 7 in part one) will not only provide a large new market in the form of enhanced information services that LECs (Local Exchange Carriers) can move in to. It will also provide LECs and other builders of the local exchange fiber optic network with a large proportion of the access fees necessary to make building the network a worthwhile investment ... the fiber optic network must be in place before the NII can grow to its full potential'.

But this curious growth scenario does not address an elementary difficulty. Surely the order of events must be first, a network to reach a sufficiently large number of potential subscribers and second, the arrival of the services? In the case of the Internet, a relatively small network already existed for defence and research purposes, and then became available for services. In the absence of a philanthropic NII builder, the system will have to grow gradually. Service providers will gradually increase and network builders will install more lines expecting heavier usage – and vice versa.

Fibreoptics

Fibreoptic cables are widely used for telephone traffic (excluding the local loop) and in Cable-TV networks. Since the cables have to be specially laid and they must be broadband to transport TV programmes, there would seem to be an incentive to take fibre all the way into homes and businesses – another area where a rosy future for all-fibre systems was forecast. But again it has not happened. For Cable-TV the most cost-effective arrangement is, and probably will continue to be for the next few years, a 'hybrid fibre-coaxial cable-' (HFC) arrangement[11]. The long-distance part of the system is all fibre but for distribution to individual homes the fibre ends in a cabinet and from there co-axial cables run into homes.

The frequencies of visible light from infrared to ultraviolet lie within a 300 THz wide frequency spectrum. If a very wideband communication-by-light channel occupies 300 MHz of bandwidth it is easy to see that 300 THz/300Mhz = 106. One million 300 MHz light-communication channels (ignoring channel separation),are available in the light frequency spectrum. The terms megabit (Mbit), Gigabit (Gbit), and Terabit (Tbit) mean million (106) thousand million (109) and million million (1012) bits respectively. Likewise for frequencies we have MHz, GHz and THz.

A system using electrical/optical and optical/electrical conversion devices interconnected by a thin glass fibre constitutes a light-transmission system of very wide bandwidth. The idea was proposed by Kao and Hockham working at Standard Telephones and Cables in 1966.[12] Corning Glass started producing fibreoptic cable (FC) in 1970.

Because very long lengths of FC can transmit light with low attenuation and few repeaters, FC is almost mandatory for undersea work. On land it is used for telephone inter-exchange cabling, Cable-TV, television and other purposes. Typical data rates are 2.5 Gigabits per second (Gbps), or 2500 Mbps, (312.5 Megabytes per second) over 40 Kms of cable.

2.5 Gbps may sound fast but it is not fast enough. SONET (Synchronous Optical Network is a relatively new SDH (Synchronous Data Hierarchy) system for transporting data through fibreoptic networks now coming into use. SONET channels run at multiples of 51.84 Mbps. Thus SONET OC-3 channels run at 155 Mbps, OC-12 at 622 Mbps, etc. While noting that SONET's arrival may have been the incentive to develop something called DWDM, we need not dwell further on SONET'S details.

DWDM (Dense Wavelength Division Multiplexing) or sometimes just WDM is a method of packing separate channels into a single strand of fibreoptic cable[13]. The principle is simple. Instead of using only modulated white light, the light is split up into colours and different-coloured light beams operating at their intrinsic frequencies are used as separate independent channels. For instance 40 2.5 Gbps channels separated by, say, 500 Mhz gaps would occupy about a 60 GHz band of frequencies. A major feature of Fibre/DWDM is its scalability. The number of channels in a single strand of fibre may be increased from one up to a number dependent on the DWDM state of art – probably reaching 40 at later in 1998. Only the equipment at either end, not the fibre itself – under the sea, under the road, or wherever – needs to be changed.

Fibreoptics is, of course, available for speeding up the Internet. It is being widely used for just that but not quickly enough. MCI's Internet backbone was until recently an OC12 622 Mbps line. By now it should be 2 x OC12 or 1244 Mbps. Presumably MCI must by now be looking at DWDM. Another company, Digital Island based in Hawaii, is assembling a star-shaped 'two-hop' fibreoptic cable network centred on Hawaii. The idea is to bypass the U.S. For example, if a user in London wants to access a Web site in San Francisco, the usual arrangement would be via a series of router-network hops across the overloaded U.S. network. The Digital Island system would establish a connection between a direct London-Hawaii line and a direct Hawaii-San Francisco line.

xDSL

HDSL (High bit-rate Digital Subscriber Line) is an improvement of DSL methods used for ISDN. HDSL was suggested by a Bell researcher J.W.Lechleider[14] in 1991. The x stands for a letter signifying a variation. Using ordinary telephone lines, the method involves advanced coding, frequency equalisation. echo cancellation and modulation – operations carried out mainly by complex chips which test the line quality and set up transmission functions accordingly. A range of variations allow for different upstream and downstream rates for telephone line lengths of up to about 5 Kms, some already standardised by ANSI and/or ETSI, at bit rates of up to 6 Mpbs[15].

During 1998, telecom organisations will be considering performance and cost-effectiveness and making decisions made about the adoption of fibre to the kerb or cabinet or right into the home. According to Wilson[16] 'every major telephone company in the country is making a deployment plan that involves using ADSL...'. But by 1997, progress became unexpectedly slow according to Shankar[17]. 'Some of the main barriers to large-scale adoption include the continuing Standards battle and the lack of interoperability'..

Perhaps Fibre to the home or xDSL will be installed in parts of the United States before the end of the century, but neither seems likely to appear on a scale likely to produce much impact before the year 2000. However, according to a recent report in *The Times*[18], the ADSL version 'is being developed by Ameritech which will begin local testing in the US in the coming months... Internet experts seem to hold out the most hope for ADSL as a realistic way of making Internet high speed connections a reality'.

The Internet: 1. Data rates and new networks

Speed: Delay: Analyzing data flow

Th Internet is the outstanding telecoms success of the nineties. Various estimates of its number of users have been made. At the beginning of 1997 it was alleged to be 60 million and expanding rapidly. A 'host' is a computer connected to the Internet, so if every host consisted of a computer used by one person the number of hosts would equal the number of users.

The major complaints made about the Internet are its slow response and the length of time taken to deliver data. The network's information capacity is being constantly increased but not quickly enough to accommodate the enormous increase in traffic. It is remarkable that the huge number of Internet hosts are able to exchange data at all without the system getting completely clogged or without intolerable delays.

I have just carried out a short test of data delivery speed. The result was, of course, controlled by the particular set of conditions prevailing at the time. After clicking on an address at 17.15 on Friday March 20th it took 125 seconds for a 2.9 Mbit full-screen full-colour picture to reach me from a server at the University of Michigan. The picture was Jan Bruegel's 'Holy family in a flower and fruit wreath' – a picture full of colour and fine detail. On-screen reproduction was of high quality. It so happened that this reasonably rapid result was not typical of the performance I usually experience at this time of day. In fact the more usual slow speed has prompted a considerable volume of research in an attempt to improve performance.

K.C.Claffy and Tracie Monk[19] who work at the National Laboratory for Applied Network Research say: 'Data characterization and flow analysis are virtually nonexistent at this time, yet they remain essential for understanding the internal dynamics of the Internet infrastructure'. The authors provide some interesting maps illustrating Internet traffic density in various parts of the world.

Selecting items from the immense amount of information on the Internet requires care. In a recent search where I used AltaVista, the terms 'Internet AND analysis' produced 520,010 hits. Author names are useful terms to achieve more specific resules if used sensibly. The author 'T.Monk' produced 136,750 hits – Thelonius Monk is a popular musician. But T.Monk AND K.Claffy produced just three hits including 'Internet data acquisition and analysis: status and next steps'[20] in which they describe the activities of CAIDA (Cooperative Association for Internet Data Analysis)[21].

More recently Apisdorf, Claffy et al[22] describe the development of an instrument called OC3MON for collecting Internet traffic data, applying their previous ideas in a practical manner. Interestingly enough their design is based on a PC and the authors are very cost-conscious. The machine does have some rather outlandish boards plugged into it and the software is quite something. Believe it or not they use a DOS operating system for very good reasons which they explain. The fibre input comes from optical splitters and connectors. They mention, in passing, that 'racks to mount 8 – 12 splitter modules are available' – hardly the adjuncts of your typical PC. Their PC requires at least 128 Mbytes of memory and is able to monitor over one million virtual circuits simultaneously. A number of graphs are included. For instance, one shows IP traffic between the US and Japan, with the dry comment 'There still seems to be a commodity (IP packets) for which the United States is a net exporter to Japan'.

Next Generation Networks

Interesting and comprehensive information is provided in the two Web references[23] about vBNS (Very high Bandwidth Network service) and NGI (Next Generation Internet).

The abstract preceding the vBNS item entitled 'vBNS:the fast lane for Research and Education' authored by John Jamison and Rick Wilder, both from MCI, says : 'vBNS is a National Science Foundation (NSF) sponsored high-performance network service implemented by MCI ... on-line early in 1995.... the vBNS backbone is currently being upgraded to OC-12 (622 Mbps) speeds. VBNS supports scientific applications between between NSF-supported SuperComputer Centers, directly connected research institutions, and research institutions which are served by other networks. The vBNS also provides a test environment for early deployment and evaluation of new internetworking technologies'.

VBNS facilities include whatever is necessary to conduct research for high-speed transmission embodying FDDI, HIPPI (HIgh Performance Parallel Interface), ATM and other existing or new techniques as may be developed. FDDI (Fibre Distributed Data Interface) was proposed as a Standard for 100 Mbps (and upwards). It includes a dual fibre ring (one main and one backup), in Token Ring Networks. HIPPI represents a further stage to increased speeds using fibre for yet more bandwidth, as required in super computer communications at speeds up to 1.6 Gbps.

In his 1998 State of the Union address, President Clinton said '... We must also make sure that we protect the exploding commercial potential of the Internet ... I ask Congress to step up support for building the next generation Internet. It's getting kind of clogged you know and the next generation will operate at speeds up to a thousand times faster than today'.

VBNS is a key part of the NNI programme and both are associated with the UNCAID's (University Corporation for Advanced Internet Development) Internet-2 system for interconnecting universities to NGI/vBNS via GigaPOPS (Gigabit per second Points of Presence).

It appears that the US government, its research establishments, universities, and a number of companies are enmeshed with the aim of actually starting to execute Vice President Gore's hopes for a universal network as expressed at the beginning of the decade (Reference 7 in part one). We can only wait and see just how soon these programmes will become incorporated in the Internet as we know it today, whether public access to faster networks will in due course be allowed, and whether new facilities will reach ahead of the current trend towards worse service caused by overloading.

It is becoming very clear that the people in charge of our destiny in the UK and in the United States believe that a very substantial effort and large sums of money must be spent on information networks. When compared with the US proposals just discussed, UK expenditure recommended for the National Grid for Learning, as described in part one, is by no means excessive. Bearing in mind the relative resources of the two countries it sounds quite reasonable.

The Internet: 2. Other new ideas

Scalable Video

Varies ways of overcoming the bandwidth/speed limitations of the Internet have been devised. One solution proposed is to scale down motion video – normally repetitive frames are generated with a smooth flow of bits at rates of up to 250Mbps. It is usually considered that quality still remains acceptable when compression techniques reducing rates to between 2 and 5 Mbps are applied. Horn and Girod describe their idea for software-implemented 'scalable video' running at down to about 50 Kbps in 'Scalable video transmission for the Internet'[24]. The system uses special coding/decoding arrangements. In the prototype system, video clips may be displayed and both picture size and bit rates may be varied while the picture quality is observed. The authors claim that : 'Support for these services within the Internet prototype layer will be widely available in the near future'.

RSVP

Another proposal described by White and Crowcroft[25] to ensure good quality is called RSVP (Resource

Reservation Protocol) : '... very detailed progress has been made in that RSVP, if supported by routers along an end-to-end data path, can permit end systems to request integrated services that provide end applications with enhanced QOS (Quality Of Service)...' RSVP is a signaling procedure that enables communications between senders, routers, and receivers during a particular session. A router is a device which switches and routes data as controlled by the Internet Protocol (IP). RSVP controls various functions along a selected network path including selection and reservation of a route with a bandwidth that is adequate to provide the required QOS. Work is continuing in order to establish user authentication and to arrange for accounting and billing. The authors state that RSVP is undergoing standardisation at the time of writing of their paper (June 1997).

Price reduction for ISDN?

As already mentioned in part one, BT announced in a News Release dated November 1977: 'a new digital communications service that will transform a customer's home telephone line into a high-speed Internet and multimedia connection ... at speeds several times faster than the fastest modem'. I tried to get some more information from the press office but it seems that the announcement means 'ISDN at a lower price for households'. The actual price was not available because BT 'will be testing a number of pricing options during trials'. It has just been advertised at £99.

IPV6

IP's 32-bit address space is inadequate and it will soon be replaced – probably in 1999. Decina and Trecordi[26] write that IPV6, the new 128-bit IP address, will improve routing and addressing capabilities. It 'provides a simple IP header format to expedite packet forwarding and class-of-service definitions based on traffic flows ... it also offers integrated capabilities for user authentication and security, including encryption'. IPV6 will ease the progress of multicast messages – the forwarding of the same message to a number of different addressees.

The Internet via your television receiver

It was recently reported in the press that a company called WebTV Networks, owned by Microsoft, would launch trials in the UK for services which already have over 300,000 subscribers in the United States. Pace will make the required set-top boxes. The US version includes the set-top box, a connection cable to the TV and telephone, and a remote controller. It sells for about $300. Pace says UK trials should start before Christmas.

According to WebTV's blurb the TV/Internet is indeed remarkable. 'Performance will be comparable to the most sophisticated computers sold. A revolutionary new architecture – not a reduced PC clone – and a combination of advanced patent-pending technologies make a device based on the WebTV reference design both low cost, mass marketable consumer product and a high-performance multimedia computer'

Langberg[27] says that 'For about $400 you can now buy an 'Internet terminal' and wireless keyboard designed by WebTV Networks Inc of Palo Alto which connects your television to the World Wide Web and serves as a post office for electronic mail'. The manufacturers are Sony and Philips Magnavox. Internet service costs $20 a month – about the same as connection to a US information provider. The wireless keyboard is not essential and is included in the price. The system can be used just with the controller which saves up to about $80.

Langberg is enthusiastic and says that TV resolution is adequate. The cost of setting up for the Internet is cut substantially since a PC is unnecessary. He claims that WebTV 'have done a brilliant job of rethinking how the Internet should function when displayed on a television set'.

Mobile communications and Standards

By 1994, cellular systems for mobile communications had become all-digital adopting the GSM 900 Standard. This Standard was later augmented by the DCS (Digital Communication Systems) 1800 Standard for operation at 1.8 GHz, both Standards following agreed specifications from ETSI (European Telecommunication Standards Institute).

The DCS 1800 enhancements to the GSM Standard were added to refine it for the support of small, low-power handsets, close proximity working, and improved internetwork roaming capabilities. GSM 'carriers' (or channels) are spaced by 200 kHz, each supporting eight full-rate speech circuits. Today, if you possess a GMS station, you could speak to anyone in the world in a country with GMS and who has a suitable receiver. However, some problems remain in achieving a truly universal personal network.

Later, the limitations of GMS's 9.6 Kbps data rate were considered with a view to increasing it to 100 Kbps or more by using high speed circuit switching and packet radio data services. In August 1997 Ericsson, Alcatel, Nokia and Siemens-GEC decided to adopt an improved version of GSM claimed to be capable of handling high speed Internet/Intranet applications, electronic mail and high speed video. This third generation system would become part of an already-proposed ETSI Standard called UMTS (Universal Mobile Communications Telecommunications Standard).

GSM supports a number of channels on a single carrier by using a technique called TDMA (Time Division Multiple Access). Small chunks of digitized speech or other data from each station are interleaved with small chunks from other stations. The gaps between data from any station are so short that there are no ill-effects. CDMA (Code Division

Multiple Access), an alternative channel-sharing arrangement, was being adopted in the United States. UMTS was then at the 'forum' stage – where these differences were being discussed. ETSI has still not concluded its deliberations and it appears as if the nearest we shall get to a 'Universal' Standard will be a version of UMTS with options for TDMA or CDMA – a compromise which is the fate of many Standards.

Visual Telecommunications: Videoconferencing

Marshall McLuhan, were he now alive, would certainly have been interested in videoconferencing; it represents a new form of technological determinism. I say new, but videoconferencing was being seriously considered at least 27 years ago – notably by AT&T with their Picturephone. The Picturephone was first demonstrated in Chicago in 1971 and cost a great deal to develop. It prompted dozens of optimistic and erroneous forecasts – for example: 'There are many users and vendors who predict that teleconferencing will be as common in the office in 1990 as the typewriter is today' (Data Communications, 1982).

Videoconferencing has been improved by advances in compression methods, chip-sets for PC boards, the arrival of 'Rollabout Units', falling prices, and wider availability of the ISDN. A 'Rollabout Unit' may be used in any room – something of an advance because earlier machines suffered from 'howl-around feedback' or 'echo'. Special acoustically treated rooms were needed with careful placement of microphones and loudspeakers to prevent feedback, particularly in 'full duplex' connections. Echo feedback is now neutralised by subtracting an echo-replica signal from the signal itself.

Although the constraints on videoconferencing are steadily decreasing, 'acceptable' performance is a matter for subjective judgement. Unless special machines are used which are inter-connected by, and are capable of working over a wideband channel, performance quality compared with TV is poor because of limited transmission bandwidth. Picture size and number of pixels is less, and frame repetition rate is reduced. Inter-frame motion compression is used but rapid movement is blurred.

For the satisfactory reproduction of motion, frame repetition rates need to be 25 per second or above. If a station is transmitting frames at this rate and the receiving station is unable to process them, it simply drops frames and operates at its own specified rate.

In a Web article[28] describing a two-person videoconferencing software package called 'Dave', there is a section headed 'Network bandwidth, in bits per second, required as a function of JPEG Q-factor for several window sizes (number of horizontal pixels x number of vertical pixels) and frame rates (frames per second) for an H-P 735 workstation'. The Q-factor is the degree of compression and reduction of quality as the compression is increased. A compression of 200 times is regarded as 'typical' – presumably meaning that any further increase in compression or a channel bandwidth too narrow to allow that bit rate would make the picture subjectively unacceptable. To provide a small window of 160 x 120 pixels at 7.5 frames per second a bit rate of 150 Kbps is required; For a 640 x 480 window at 30 frames per second, a bit rate of about 5 Mbps. This shows that problems in providing an adequate channel even when the bit rate is reduced by compression are severe.

Cordell at al[29] describe a system for teleconferencing with many participants (multicasting) over the Internet – a meeting for a number of people. The IETF (Internet Engineering Task Force) has developed H.323 – a Standard for audio and video – ratified by the ITU (International Telecommunications Union, in 1996. It specifies gatekeeper control for multicasting.

Lewis and Cosier[30] have inherited the mantle of Short et al[31] – who wrote an excellent book about telecoms psychology back in 1976. Contrasting videoconferencing with television, they say: 'The technical, ergonomic, cultural, social, and psychological requirements of more natural telecommunications are not the same as entertainment ... It is unlikely that ... videoconferencing will become a wholesale replacement for face-to-face contact'.

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The public reception of the Research Assessment Exercise 1996

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Abstract

This paper reviews the public reception of the Research Assessment Exercise 1996 (RAE) from its announcement in December 1996 to the decline of discussion at end May 1997. A model for diffusion of the RAE is established which distinguishes extra-communal (or exoteric) from intra-communal (or esoteric) media. The different characteristics of each medium and the changing nature of the discussion over time are considered. Different themes are distinguished in the public reception of the RAE: the spatial distribution of research; the organisation of universities; disciplinary differences in understanding; a perceived conflict between research and teaching; the development of a culture of accountability; and analogies with the organisation of professional football. In conclusion, it is suggested that the RAE and its effects can be more fully considered from the perspective of scholarly communication and understandings of the development of knowledge than it has been by previous contributions in information science, which have concentrated on the possibility of more efficient implementation of existing processes. A fundamental responsibility for funding councils is also identified: to promote the overall health of university education and research, while establishing meaningful differentiations between units.

Introduction

The passion with which disputes are pursued within a community can sometimes only be matched by the indifference with which they are viewed from outside. For instance, Conan Doyle created a fictional character whose immersion in criminal milieux rendered him indifferent to the preoccupations of significant sections of late Victorian society:

> 'I didn't think there was a soul in England who didn't know Godfrey Staunton, the crack three-quarter, Cambridge, Blackheath, and five Internationals. Good Lord! Mr. Holmes, where *have* you lived?'
>
> Holmes laughed at the young giant's naive astonishment.
>
> 'You live in a different world to me, Mr. Overton, a sweeter and healthier one.'
>
> *(Conan Doyle 1980: 389)*

At a further extreme, there can be a simple lack of awareness of issues in the enveloping society. Approaching closer to the empirical focus of this article, Samuel Johnson commented on the bitterness with which scholarly disputes were pursued despite their lack of practical implications for communal welfare:

> It is not easy to discover from what cause the acrimony of the scholiast can naturally proceed. The subjects to be discussed by him are of very small importance; they involve neither property nor liberty; nor favour the interest of sect or party. ... But ... there is often found ... a spontaneous strain of invective and contempt, more eager and venomous than is vented by the most furious controvertist in politics against those whom he is hired to defame.
>
> *(Johnson 1984: 448)*

Such might be the fate of the Research Assessment Exercise 1996 (RAE), of acute interest within academia but perceived as marginally relevant or simply not known in a broader public context.

The initial reception of the RAE (from December 1996 to end May 1997) in widely publicly circulated media can be studied to investigate whether this pattern of intra-communal passion and wider public indifference is revealed and in order to reflect on the process of research assessment. A distinction between types of media and the communities to which they are primarily addressed can be made which corresponds to the contrast of intra-communal interest and extra-communal indifference. Esoteric media and communities, located centrally within the milieu of university education and research, can be distinguished from exoteric media and communities in the wider public domain.

A further significant distinction can be made between dissemination and diffusion. Dissemination would refer to the processes of transmission of the message or expression (which can be a physical product such as a journal or monograph or a sequence of electronic signals) from sender to receiver. Diffusion would cover the processes of understanding, including adoption, modification or rejection by scholarly or other communities. Dissemination is an essential precondition for diffusion but should not be identified with it. Diffusion could be expected to be more complex and less amenable to centralised control than dissemination. Aspects of diffusion, such as the level of understanding or the extent of rejection or adoption by receiving communities, may change over time. Development over time will therefore also form an important dimension for this study.

This study briefly discusses the dissemination of the RAE results in December 1996 and then concentrates on their diffusion over time through significant exoteric and esoteric media during the period to end May 1997. The exoteric media covered are principally the national and regional newspapers. Esoteric media studied are primarily those shared across university and research communities (principally *The Times Higher Education Supplement* (here referred to by its short title, *The Times Higher*)). The educational supplements published with national newspapers can be regarded as esoteric elements placed within exoteric contexts. A further level of granularity within esoteric media and communities would be intra-disciplinary communication and some attention is given to the journal literature of library and information studies. The focus of attention throughout is dual: both on the processes of dissemination and diffusion and on the topics discussed.

Data for the study was acquired by relatively informal and more formal methods. Relevant media were scanned at critical dates, although not all newspapers, particularly regional newspapers, were directly seen. A retrospective literature search was conducted through the UKNEWS and SCITECH groups made available by FT Profile (Note 1), using a query equivalent to 'research assessment exercise OR (rae AND research)' across the full text of records. The files in these groups, with the notable exception of *The Financial Times*, receive limited, although increasing, assigned indexing and no assigned term directly descriptive of the RAE was found. Comparison of results obtained by relatively informal and more formal methods suggested that the formal retrieval results were relatively, although not entirely, comprehensive and that there was a degree of complementarity between the methods used. The principal anticipated fora for discussion were, then, covered by the processes of retrieval. Radio and television broadcasting, for which there are more limited facilities for retrieval and more restricted possibilities for obtaining items after their time of dissemination, were not covered by the formal literature search, although concurrent attention indicated limited discussion of the RAE.

Empirical study

Dissemination

The initial public dissemination of the RAE shows evidence of careful central coordination and control. The results were made available through the Higher Education Funding Council for England's (HEFCE) website (Joint Funding Councils of the United Kingdom 1996) from 11am Thursday 19 December 1996. National newspapers (*Guardian* 20 December 1996; *Independent* 20 December 1996; *Times* 20 December 1996; *Times Education* 20 December 1996) reported on these results, without necessarily giving a full listing but presenting analyses derived from the results, in their editions of Friday 20 December. *The Times Higher* for that day gave a full listing together with fuller comparative tables and graphics (*Time Higher* 20 December 1996a). Both *The Guardian* (20 December 1996) and *The Times Higher* (20 December 1996b) also refer the reader from their to printed versions to fuller data sets available on their institutional websites. Electronic media were, then, critical to the initial process of dissemination – the HEFCE website reportedly received 330 hits on Christmas Day (*Times Higher* 10 January 1997a) – and have remained readily available over time. Printed media were secondary in rapidity of dissemination and in wide publicly availability over time, although they can be deliberately retrieved. For processes of diffusion, particularly the development of understanding through public discussion, printed media reassumed their historically dominant role.

Diffusion

Exoteric media

Diffusion of information about the RAE into exoteric media has been stratified. Data and discussions reach such papers as *The Guardian* (20 December 1996), *The Times* (20 December 1996), *The Independent* (20 December 1996), *The Observer* (22 December 1996; 29 December 1996; 5 January 1997; 12 January 1997) and *The Sunday Times* (30 March 1997), but no trace was discovered in the larger circulation daily and Sunday newspapers. The discussions tend to be deliberately explicatory, carefully contextualising the RAE and giving definitions before grades. Regionalism and nationalism emerge as highly significant contexts to which the RAE results are assimilated, most explicitly in newspapers from Scotland and Northern Ireland. The number of articles dealing with the RAE declines sharply over time from December 1996, reflecting the press's known strong preference for currency, although institutional disputes can still obtain attention.

The nature of the diffusion of the RAE into exoteric media can be read to imply a limited public awareness of the economic or social value of learning. The initial reception tends to present a set of institutions competing for prestige and funds, without giving attention to the use rather than the exchange value of their research activities. *The Financial Times*, despite its generally extensive concerns, concentrates upon the performance of business schools (*Financial Times* 23 December 1996). When discussion of the RAE does reach *The Economist*, it is presented in terms of the financial rewards for research, not the value of learning (*Economist* 1 March 1997) and is not connected with another, more prominent, discussion of the economic benefits of education (*Economist* 29 March 1997a, b). Yet the extent of the diffusion of the RAE into public discourse is reflected in its repeated citation with regard to individual institutions in evaluations intended to inform student choice.

Members of the esoteric community have recognised the significance of exoteric media for communicating with a wider public and for political persuasion. The most notable example of this is an article in *The Observer* by the vice-chancellors or equivalent of four major research universities arguing for a clearly differentiated elite group of universities (*Observer* 22 December 1996). The institutions (Warwick University, Cambridge University, The London School of Economics, and Edinburgh University) were subsequently labeled the 'fratricidal four' (*Guardian Higher* 14 January 1997a). A pattern of dual publication, with communications adapted to the different demands of exoteric and esoteric media, is also discernible. The local significance of some universities is reflected in the space made available in regional newspapers for articles produced by their members. At a national level, after the period of initial reception, the concerns of the esoteric community tend to emerge in the exoteric media only when they reflect the difficulties academics share with other citizens, such as continuity of employment and of their employing institution.

The literature search of exoteric media also served to remind that research is a wide, not necessarily institutionally supported, endeavour not limited to the restricted set of activities acceptable for the RAE. The most engaging example of unintended recall (recalled by the search statement 'rae AND research') came from *Scotland on Sunday* and embodies both nationalism and the diversity of research: 'Did Englishmen eat each other? In the 150 anniversary year of Sir John Franklin's death, Tom Pow considers why his failed endeavour overshadowed the greater achievement of the Orcadian explorer John Rae' (*Scotland on Sunday* 26 January 1997). Considering the fratricidal four, Voltaire might have concluded that they still would if they could ('pour encourager les autres') – and that Edinburgh had acquired this English characteristic.

Esoteric media

Discussion of the RAE in shared esoteric media contrasts with its treatment in exoteric fora. Rather than being deliberately explicatory, a degree of prior knowledge of the procedures of the RAE and its immediate institutional context is assumed. The discussion can even become cabalistic in the sense that grades can be cited apart and begin to detach themselves from the activities to which they refer. A further influence on academic discourse is revealed by reference to the RAE in reviews which have no immediate connection with it: Isaiah Berlin's work was 'emphatically not an oeuvre for the Research Assessment Exercise' (*Times Higher* 31 January 1997d). An absence of false or unintended recall was noted and this could be explained by the preliminary filtering effect of the educational context of discussion.

In esoteric sections of exoteric media, the topics discussed, such as the organisation of higher education, tend to be those present in other esoteric media. However, the level of analysis is higher, rarely straying below an institutional level. The mode of presentation, although not heavily explicatory, is closer to the enveloping exoteric medium and seems intended to ensure intelligibility within wider public fora.

A further level of granularity within esoteric media would be intra-disciplinary forms of public communication, predominantly journal literature. Informal conversations among members of disciplinary communities may over time be transformed into journal articles. There are traces of this in the shared esoteric literature, in the form of reference to specific future publications (*Times Higher* 28 February 1997e). The process of peer review (if this is applied), editorial selection and production and dissemination of the journal is likely to ensure that such articles appear at a later date than discussions in shared esoteric media. A strong focus upon the discipline of assessment could also be anticipated and is apparent from those which have appeared (for instance, with regard to accountancy (Whittington 1997) and library and information management (Law 1997). This form of esoteric communication could be expected to be in the early stages of development and does not form part of the primary focus of this study, although it can be assimilated to the model of diffusion proposed here.

Model of diffusion

A model for the public diffusion of the RAE can, then, be formalised. Two major types of public communication, exoteric and esoteric, are distinguished. Further distinctions can be made within these categories, critically between trans-disciplinary, or shared, and intra-disciplinary esoteric literature. Each form of discourse has specific characteristics. If a topic migrates between or is simultaneously diffused in exoteric and esoteric discourse, it will tend to be treated in a manner characteristic of the immediately enveloping medium. This tendency can be ascribed to the participants in the public conversation holding a model of communication, although possibly only informally or partially, similar to that formalised here: authors may adapt their communication to the intended forum of publication and editors, in their gatekeeping role, may filter out inappropriate communications or modify them towards their publication's style of discourse. With these dimensions in mind, of an exoteric: esoteric distinction and of change of over time, the relevant literature can be reviewed.

Early development

Some common themes emerge in both esoteric and exoteric media, particularly in the early stages of diffusion (to c. end January 1997). Strategic use of data to press institutional or departmental cases occurs in both, although the level of focus tends to be finer in esoteric fora, to the department not the institution. Even where the nominal issue is to general issues and procedures, a contribution can be read with reference to the writer's own situation: for instance, there is a direct correspondence between the numbers of staff and the grades obtained by the departments in the fictional example of two 2 rated departments, one with 'three researchers of international excellence and three who are young and full of promise' and the other with 'three complete woodentops and three worthy hacks squeezing out a little dull work of national quality' (*Times Higher* 3 January 1997c) and the contributor's own department. While seeking political influence, scholars may betray political naiveté: some even seem to have forgotten Denis Healey's First Law of Holes – when you are in one, stop digging (Healey 1996). There is an unsurprising absence of departments proclaiming their undeserved good fortune. Common to both esoteric and exoteric fora is an uncritical misuse of citation data (*Guardian* 23 December 1996) and a strong tendency to see issues in institutional not structural terms.

The early diffusion of the RAE betrays some of the characteristics of a spoken conversation. Contributions can be brief and in immediate response to other contributions (for instance, articles and letters published in one edition of a Sunday newspaper may receive responses in the next (*Observer* 22 December 1996; 29 December 1996; 5 January 1997; 12 January 1997)); indiscreet remarks can be made, without the saving impermanence of informal oral utterance; influence is sought, and there is an absence of systematic reflection. A further stage of development is that of anecdote, which appeals to the exoteric media's known preference for the personalisation of issues, and is also present in esoteric media. The recurrent implication of these anecdotes is the RAE has had the undesirable effect of encouraging short term, functional research and discouraging

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level from the end of May 1997 onwards. Themes announced in the early stages of diffusion are adopted and transformed. Reflection over time occurs predominantly, although not exclusively, in the esoteric literature and in esoteric sections of exoteric media. The discussion can usefully be considered under a number of themes.

Spatial dimensions

A number of issues connected with the geopolitical distribution of research arise. More technical considerations to do with interpretation of critical terms, particularly of 'international excellence', used in the definitions of grades occur primarily in the esoteric literature. Some contributions argue that the process of peer evaluation has been too inward-looking, without input from real foreign referees, and that a weak understanding of international has therefore emerged (*Times Higher* 10 January 1997b; 21 February 1997a; *Guardian Higher* 15 April 1997). A bibliometric study intended to provide fuller international comparisons with France, Germany Australia and the United States is reported, although the known Anglo-American bias of the data to be used (the ISI indexes) is not mentioned as a methodological reservation (*Times Higher* 21 February 1997b). Disciplines, with the notable exception of philosophy, are not usually conceived as being significantly geospatially distributed. Reflection on these contributions and directly on the process of research assessment would suggest: that 'international *excellence*' has been generally understood as international *participation* in scholarly communities, particularly through journals and conferences; that international has often been received as Anglo-American or, with a broader reference, as English language communication; and that contrasts in understandings of disciplines from different locations and different local cultures may not have been fully explored.

References to the regional role of universities and to the distribution of funding decisions to the constituent nations of the United Kingdom emerge in both the exoteric and esoteric literature. The importance of particular universities to a region is revealed from both exoteric and esoteric media is any reference to the pleasures of location as a resource for attracting or retaining research active staff.

Organisation of universities

Issues connected with the organisation of universities, both their relation to one another within a national framework and their internal governance, particularly their internal procedures for the distribution of funds, arise. These feature in the exoteric literature, in esoteric sections of the exoteric media, and in esoteric discussions. The level of interest characteristically becomes finer, descending from a national to an institutional and departmental level, as topic moves from the exoteric to the esoteric literature, with esoteric portions of the exoteric media occupying a transitional position. Anecdote can cross the exoteric:esoteric boundary and topics connected with academics as employees emerge in both types of literature.

The article in *The Observer* received as arguing for a clearly distinguished elite group of universities can be regarded as a member of the esoteric community deliberately addressing the exoteric community. It generates a debate which migrates to the esoteric literature and which gains the closer and deeper focus characteristic of those fora. As the discussion develops, its specific origins are disguised or forgotten, a process characteristic of the transmission of ideas (Kuhn 1970) (consider also the citation of secondary sources), and it becomes transformed into a recognisable theme of an elite group of universities.

Different aspects to the discussion of an elite group can be distinguished, its existence, its possible existence, and the desirability of its existence, although these are not necessarily clearly differentiated by contributions. Strategic intentions can be detected in the institutional affiliations of contributors. Arguments for formal differentiation of an elite group tend to come from members of the intended elite and to point to strong existing informal differentiations, particularly those revealed by orderings of universities derived from aggregations of RAE data. Arguments against differentiation originate mostly

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ary 1997b). In a departure from the established pattern, one member of the intended non-elite does argue for formal differentiation of the functions of universities and the extent to which they should engage in research (*Times Higher* 3 January 1997b).

The consensus of academic sentiment, as indicated by a survey conducted before the RAE results were announced, is against a formal elite (*Times Higher* 10 January 1997c) and this could be connected with the numerical predominance of the intended non-elite. A more subtle response to calls for an elite, again emerging the from the intended non-elite, is an advocacy of diversity, coupled with an insistence that a differentiation of functions, for instance between teaching and research or regional, national and international roles, need not be equated with a hierarchy (*Times Higher* 7 February 1997b). The implied distinction between description and value may be valuable, particularly for considering future development, but, in the immediate context of competitive allocation of resources, does not command full conviction – Aesop's fox was convinced the grapes were sour.

Covert elitism is sometimes detected in the decisions taken on the distribution of funds (*Times Higher* 18 April 1997a). Neither the ratios assigned to RAE grades, nor the factors to be applied to subject groups (Band A: high cost laboratory or clinical subjects; Band B: intermediate cost subjects with a technical, experimental or practice-based element; and Band C, for all other subjects), were known prior to the announcement of the RAE results. There was a general understanding, which proved incorrect, that 5* (Research quality that equates to attainable levels of international excellence in a majority of sub-areas of activity and attainable levels of national excellence in all others) was reserved for recognition and would not carry extra funding (*Times Higher* 18 April 1997a). The publicly stated reason given by HEFCE for not specifying differentials in advance was to protect the objectivity of the assessment process (*Times Higher* 18 April 1997a). Comments elicited from institutions favoured by funding decisions tend to view them as just whereas those from disadvantaged institutions regard them as inhibiting future developments cils form the other component of the dual system of public research funding operative in the United Kingdom and their focus of interest is the research group or project not the institution. Concerns have been expressed about the lack of full support for research infrastructure (including library and information services) offered by Research Councils (*Times Higher* 28 March 1997a; *Guardian Higher* 8 April 1997). Universities also have autonomy in their internal distribution of RAE funds. These factors which might enable research group or intra-institutional autonomy and limit the reach of RAE funding differentials as a policy instrument are constrained by the prestige conferred by high RAE gradings. Prestige acquires an economic value by its role in attracting research funding from public, and from private, agencies (*Times Higher* 21 February 1997c). It can also influence intra-institutional allocation of funds, although conflict is still apparent, particularly in connection with strongly rated research groups within weaker institutional contexts (*Guardian Higher* 18 February 1997a). Yet the overall effect appears analogous to the Matthew effect ('unto every one that hath shall be given'), known to studies of scholarly communication in the form of the accumulation of citations by the already highly cited.

The department represents a significant level of concern immediately below that of the institution. More technical issues, such as the research grade and staff:student ratio required to avoid intra-institutional cross-subsidy, are confined to the esoteric literature. Departments closed, or threatened with closure, on the grounds of low grades obtained in the RAE are also reported in esoteric sections of the exoteric literature (*Guardian Higher* 4 February 1997). In one instance, an appeal is made through an exoteric forum on behalf of a department threatened with closure despite good RAE performance (*Guardian* 18 February 1997).

A final level of concern is that of the individual employed by a university. The idea of the individual or cluster of individuals as the locus of research emerges in the esoteric and exoteric media. In esoteric media, there is discussion of the possibility of assessments of individual researchers by assessment panels and internally by universities (*Times Higher* 28 February 1997e). It should be noted that this represents a transformation of the definitions assigned to grades: these refer to relative proportions of sub-areas of research (which may be identified with individuals) at levels of international and national excellence not directly to individuals. Informal conversations suggest that this transformation, which enables finer distinctions than international/national (a 7 point scale is in use) has permeated the shared language of academic discourse.

The transformation of the interpretation of the grades can be understood from classic perspectives on language. Wittgenstein urged, 'Let the use of words teach you their meaning', and further observed that, 'For a *large* class of cases – though not for all – in which we employ the word 'meaning' it can be defined thus; the meaning of a word is its use in the language.' (Wittgenstein 1958: 43 and 220) From this perspective, we should recognise that original definitions have not fully prescribed the use of grades, although they have been strong influences, and examine the use of grades to discover their meaning in use. The structuralist principal that meaning is a product of mutual differences between items in a system (Saussure 1983) would account for the differential interpretation of grades. A highly specific analogy is provided by Saussure's brief discussion of artificial languages: the creator of an artificial language only controls it so long as it is not in circulation; once in general use it develops according to influences which have nothing in common with its logical interpretation (Saussure 1983:76). Influences apparent from the development of the artificial language of the grades are a desire for finer differentiation than the binary contrast national/international and a tendency towards individualism. Disciplinary cultures will emerge as a further influence.

In esoteric and exoteric media, particularly in the early stages of diffusion, the individual as the locus of research emerges in anecdotes which take the talented individual trapped in an indifferent or declining context as their theme (one senses a transformation of the Christian and romantic motif, present in popular histories of science, of a prophet without honour in his own country). Reports of research assessments of individuals, characteristically cast in terms of RAE grades, being used to determine conditions of work, including the distribution of duties across research, teaching and administration, promotion decisions, salaries paid, and the continuity of employment, emerge first in esoteric media (*Times Higher* 7 February 1997a, c; 28 February 1997d; 28 March 1997a, b). The issue of continuity of employment may then be diffused, after some delay, to exoteric media (*Herald* 18 April 1997; *Sunday Times* 30 March 1997) and their esoteric sections (*Guardian Higher* 18 February 1997b; *Independent Education* 24 April 1997). Non-academic employees, and other implications of changes in university funding for local economies, are characteristically neglected. Hints of a more systematic perspective, not limited to anecdote or reports of current events, are contained in observations of a convergence with United States patterns of employment for university academic staff (*Sunday Times* 30 March 1997) and of the dangers of reinforcing effects on research differentiations over time, particularly with regard to patterns of recruitment of individuals.

In summary, then, although a debate on the organisation of universities is signally initiated in an exoteric forum, the subsequent discussion largely migrates to esoteric fora. More technical issues are confined to the esoteric literature while employment issues, which reflect concerns academics share with other citizens, permeate to the exoteric literature.

The concatenation of effects from national decision to individual academics, particularly those associated with funding differentials, ensure that traditional scholarly isolation, itself misleading as an image of actuality, has been invaded by effects induced by a competitive external environment.

Disciplinary issues

Disciplinary cultures can be discerned as influences on the process of assessment and upon the reception of grades obtained. For instance, philosophy, particularly analytic philosophy, might insist on strictly logical and numerically precise interpretation of the definitions attached to RAE grades and this is strongly implied in the intemperate protest already noted (*Times Higher* 3 January 1997c) (and is supported by informal discussions with members of the philosophy assessment panel). A managerial understanding of the value of strategic development over time can be sensed in Warwick Business School's guarded expression of regret at not obtaining a 5* (*Times Higher* 27 December 1996). From history, the process, although not the broader context, of assessment is examined with attention to narrative detail (*Times Higher* 10 January 1997c).

Contrasts within and between disciplines are asserted to have had critical effects on the value attached to different forms of research by assessment panels, in apparently independent contributions. Within philosophy, Anglo-American analytic philosophy (whose dominance in the process of assessment has been suggested) is accused of being unsympathetic to continental European philosophy and of undervaluing contributions in this tradition (*Times Higher* 28 February 1997e). The different understandings of a discipline revealed with regard to philosophy would be characteristic of the human and social sciences where contrasting paradigms may be held simultaneously, rather than successively by different groups, and, where, to a lesser extent, some members of a paradigm may disparage work produced in another. Within the natural sciences, where successive paradigms are the expected pattern (Kuhn 1970), there are traces of similar conflicts, although groups are marked by more clearly differentiated labels. For instance, environmental sciences consider that they have been disadvantaged by a failure of understanding (or strategic group self-protection) by assessors from the earth sciences (*Times Higher* 10 January 1997f). The extent of understandings shared between the parties involved seems, then, strongly to influence the process of assessment.

A contrast which emerges across a number of disciplines is between theoretically and practically oriented research, with reports of a higher value being placed upon theoretical research. Comments suggest that this creates particular difficulties for areas of study allied to professional practice, where, in addition to an ethos not oriented towards research, a dominant mode of investigation may be strongly empirical (*Times Higher* 3 January 1997d; 7 February 1997d; 7 March 1997a). It is also perceived as a discriminating factor between groups of institutions, disadvantaging the new universities which are developing their research activities within an inherited and continuing practical and possibly local orientation (*Times Higher* 31 January 1997e).

Contrasts between disciplines point to the social natures of the processes of communication and negotiation by which RAE gradings are constructed. Different panels interpret assessment criteria in distinctive ways which can plausibly be connected with their disciplinary culture. Cultural dissonance between parties can result in outcomes perceived as unsatisfactory by the disadvantaged party. A critical feature of *inter*-panel contrasts would be that grades obtained, despite their nominal equivalence, do not refer to commensurate levels of research across disciplines. Any further study based upon statistical analysis of grades, conceived as data, must recognise this, although a standing danger for such studies is to neglect reservations originally made on the commensurability of data. An analogy can be made with citation analysis, where the specific significance of particular citations can be lost when they are manipulated in aggregate form. Although grades are not necessarily fully comparable as indicators of the level of research, they are made commensurate when they are re-interpreted for their exchange value, as factors for the allocation of funds.

Research and teaching

Conflict between the demands of research and teaching is frequently reported. This is primarily seen at the level of individual motivation and the distribution of time and energies encouraged by the extrinsic rewards, such as intra-institutional career development and the possibility of inter-institutional mobility, regarded as primarily associated with research. Teaching is seen as a localised activity which may, and, even then only uncertainly, attract intra-institutional rewards (*Times Higher* 31 January 1997f). The aggregate tendency of individual motivations is regarded as encouraging an institutional focus on research rather than teaching (*Times Higher* 7 March 1997c; 18 April 1997b, c). Some contributors recognise this and argue for extrinsic rewards for teaching which would change institutional foci (*Guardian Higher* 22 April 1997), possibly with systematic differentiations between the degree of institutional orientation towards teaching or research (*Times Higher* 17 January 1997c). Elements of strategic positioning, with arguments for recognition for teaching emerging from institutions with low research rating and an inherited emphasis on teaching, can be discerned.

The value of the products of research to the teaching process is seldom discussed. A significant, if familiar, distinction is made between textbooks intended to assist teaching and research published in refereed journals. The low value attached to

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textbooks in the RAE is regretted (*Times Higher* 18 April 1997c). Contributions reveal, in a rather unreflexive way, the patterns which have been discerned in the transmission of scientific knowledge; textbooks are central to the initial stages of induction into a scientific community; the primary scientific literature is studied at a later stage (Kuhn 1970). A more sophisticated understanding of the processes of diffusion from research to instructional literature is absent.

In summary, then, the frequency of references to a tension between research and teaching points to the depth and pervasiveness of the experienced conflict. It is perceived primarily at the level of the individual (even where it is claimed that good researchers tend to be good teachers (*Times Higher* 18 April 1997c)) and only secondarily in systemic terms. Intra-professional issues, such as career development, are largely confined to the esoteric literature; the exoteric literature is primarily concerned with the quality of students' educational experience, although the motivation of staff towards teaching is acknowledged as one factor influencing this.

Culture of accountability

The RAE could be regarded as part of the contemporary emphasis on evaluation and assessment, with numerically manipulable outcomes being preferred. A few contributions recognise this (*Times Higher* 21 February 1997d; *Herald* 26 February 1997), although the RAE is not always fully contextualised in this respect. Where the influence of a culture of accountability is recognised, the unproductive labour involved in reporting and the absence of a holistic view of a university's activities can be regretted (*Herald* 26 February 1997). Increased government control of research is also denounced (*Times Higher* 7 March 1997b).

A critical, and widely recognised (HEFCE 1997, paragraph 36), feature associated with evaluative measures is change in the behaviour of the objects evaluated in response to known or anticipated assessment criteria. Nominal improvements can occur without substantive developments. Features of research identified which could be regarded as examples of responsive changes include: changes in patterns of publication towards refereed journals and monographs from academic publishers (*Times Higher* 28 February 1997e); a reduction in communication with other disciplines and a wider public (*Guardian* 2 April 1997); a change in academic culture when compared to the 1950s and 1960s (*Times Higher* 21 February 1997e); and, perhaps most disturbingly, a redistribution rather than increase in research activity. When theorised, these are regarded as 'inadvertent effects' (*Times Higher* 17 January 1997d) rather than directly connected with understandings of accountability.

The results of evaluations, when made public, can be adapted to purposes for which they were not originally intended. RAE results appear, together with Teaching Quality assessments, in articles in the exoteric media intended to inform student choice (*Times* 28 January 1997; *Independent* 6 February 1997). In this respect, students would seem to be conceived as potential consumers of educational products and are provided with measures to sharpen their capacity for discrimination between products.

Reflection on the RAE from the perspective of a culture of accountability suggests some strong, possibly conflicting, tendencies, which may have significant future implications. A continuing stress upon monitoring and directing the use of public funds and upon the quality of research products can be anticipated. Within this broad context, and particularly from the perspective of funding councils, there might be a temptation to change methods and criteria in order to prevent nominal adaptation being pursued at the expense of substantive developments. Yet the unproductive labour associated with the RAE and the wariness of unintended, and unwelcome, effects indicate resistance to assessment and to changes which would increase its burden. Finally, the literature betrays a disturbing lack of support for the positive functionality of the RAE.

Analogy with the organisation of professional football

An analogy is repeatedly made between the transfer patterns and league tables of professional football and those associated with the RAE (for instance, *Guardian Higher* 7 January 1997, 14 January 1997a, b). The analogy may have an unexplored depth. The concept of place was crucial to the development of professional football, so fundamental that is critical role was only fully noticed when disturbed. Labour rapidly became mobile and the significance of this has recently increased. The relative importance of place has been further eroded by the power of entrepreneurial capital. History may only remain an influence for maintaining status when the circumstances which assisted development are renewed.

Analogous developments can be detected in the organisation of universities. Labour has long been mobile but the relation of an academic to their institution is increasingly being laid bare as one of selling the products of intellectual labour. Place is still significant although the pleasure of location could be regarded as a surrogate for salary differentials. History seems most significant to those institutions, the new universities of the 1960s and 1990s, which inherited cultures not fully adapted to a research environment. Long duration does not by itself guarantee high current significance.

The deeper analogies between the organisation of professional football and the distribution of university research are read from, rather than stated or even implied by, the contributions which indicate similarities in transfer patterns and league tables. As such, further exploration is beyond the scope of this article. Yet it is disturbing that potentially highly revealing aspects of an analogy are left below the level of deliberate implication and does again suggest the rather unreflexive and unsophisticated character of the public discussion of the RAE.

Conclusion

The approach taken here contrasts with other treatments of the research assessment exercises in the information science literature. In summary, they have taken the research assessment exercises as a given and concentrated on adapting established techniques, particularly, although not exclusively (Hodges and others 1996), citation analysis (Oppenheim 1995; Seng and Willett 1995), to the evaluation of research. The use of these techniques in assessment is then advocated as more economic than the procedures which have been used in the research assessment exercises.

A broader responsibility to inform discussion of the research assessment exercises and their effects from understandings of scholarly communication and of the development of knowledge has not yet been accepted. Some possible contributions can be indicated. The idea of discourse communities and of scholarly communication as a public conversation (Wilson 1983) could help identify the changed interval between public contributions required, particularly in the humanities, by research assessment procedures as a critical development. The value of a continuous public conversation to the development of eminent researchers could also be explored. Most critically, the known productivity of margins and transitions could be used to counter calls for an elite of institutions and to point to the dangers of rigidity and stagnation associated with restrictions on entry to scholarly communities. In some respects, for instance, in their attention to the processes of peer review, the studies sponsored by the Higher Education Funding Council for England (HEFCE) (HEFCE 1997; McNay 1997) have been more sophisticated and comprehensive in their understanding of scholarly communication than those emanating directly from information science.

The approach adopted in this article has been informed by understandings of scholarly, and other, forms of communication. The rather heterogeneous voices emerging in the public reception of the RAE have been assimilated to a model of communication which makes a crucial distinction between exoteric and esoteric, or extra- and intra-communal, media. Forms of communication not directly studied, such as intra-disciplinary considerations of the process of assessment for that discipline, could also be understood in terms of this model. In contrast to the HEFCE sponsored studies, which are inevitably historical in character (a study (McNay 1997) published in 1997 deals with the impact of the 1992 Research Assessment Exercise), the data offered by public discussions of the RAE is more current. It also gives the impression of being richer, fuller and more diverse than that gathered by questionnaires or elicited from focus groups, where possible responses are, to some extent, constrained by the categories brought to the study by researchers.

The analysis and categorisation offered here may have given an appearance of systematicity to a diverse set of contributions. Reflection on contributions does identify a fundamental responsibility for funding councils: to ensure that evaluative methods, while producing meaningful distinctions between units assessed, contribute to the health of the system as a whole. The tenor of the public discourse studied here suggests that this responsibility is unlikely to be assumed by individual institutions. The individual rational economic self-interest of members of a system may not maximise group or wider communal benefit. Councils may wish to work towards ensuring the coincidence of institutional interest and social benefit. A fuller understanding of the forces influencing research systems can assist the construction of policies towards that desirable end. The value of this study would be in contributing towards the development of that understanding.

Finally, it could be suggested that while an institutional context can encourage an appropriate motivation towards research, it cannot impose it. Roland Barthes' exhortation, although addressed to the young in research, remains inescapable:

> The task (of research) must be perceived in desire. If this perception does not occur, the work is morose, functional, alienated, impelled solely by the necessity of passing an examination, of obtaining a diploma, of insuring a career promotion. For desire to be insinuated into my work, that work must be *demanded* of me not by a collectivity seeking to guarantee my labor and to gain a return on the loans it grants me, but by a living collection of readers.'
>
> *(Barthes 1986: 69-70)*

And, in every new project, we may remain young.

Note

1. In June 1997 the group UKNEWS consisted of the following files: *The Daily Telegraph and The Sunday Telegraph*; *The Financial Times*; *The Guardian*; *Today*; *The Times and The Sunday Times*; *The Independent and The Independent on Sunday*; *The Northern Echo*; *The Observer*; *Lloyd's List*; *The European*; *The Scotsman and Scotland on Sunday*; *The Economist*; *Today's Financial Times*; *The Herald*; *Daily Mail and The Mail on Sunday*; *Evening Standard*; *The Irish Times*; *The Mirror and Sunday Mirror*; *Daily Record and The Sunday Mail*; *The People*; *The Times Educational Supplement*; *The Times Higher Education Supplement*; *Press Association*; *Regulatory News Service*.

The group SCITECH consisted of the following files: *New Scientist*; *The Economist*; *The Guardian*; *Financial Times*; *Computergram*; *US Telecommunications*; *Flightline*; *McGraw-Hill Aerospace*; *McGraw-Hill Computing Cable, Satellite & TV News*.

Printed equivalents are adequately revealed by file titles.

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